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The Thermodynamic Kelvin Temperature Scale from 273.15 K to 415 K

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(April 17, 1973)

The investigation of the effects of sorption in a gas thermometer used to realize the Thermodynamic Kelvin Temperature Scale has been continued. By eliminating sorbable material more completely from the gas thermometer, we attained higher gas purity. So little contaminant remained that further cleanup produced no significant effect on the values of thermodynamic temperatures measured between 0 °C and 142 °C. The results are presented by giving the differences between the values on the thermodynamic scale and the International Practical Temperature Scale of 1968. The value of the steam point was determined to be 99.970 °C(therm) with an uncertainty of ±3.5 mK at the 99 percent confidence level (based on 3 times the estimate of the standard deviation).

Key words: Gas thermometry; International Practical Temperature Scale of 1968; sorption; steam point; temperature standards; Thermodynamic Kelvin Temperature Scale.

1. Introduction

The value, 273.16 K, was assigned in 1954 [1][1] to the temperature of the triple point of water on the Thermodynamic Kelvin Temperature Scale (TKTS). In selecting a single value to fix the size of the degree, the Comité Consultatif de Thermométrie (CCT) [2] acted as Kelvin had suggested in 1854. It was the consensus of the CCT then that this choice would make the temperature interval between the ice and steam points very near to 100 degrees.

The value chosen was a rounded average of four single values, each derived from researches at the following institutions: the Physikalisch-Technisches Reichsanstalt (Germany), the Kamerlingh Onnes Laboratory (the Netherlands), the Tokyo Institute of Technology (Japan) and the Massachusetts Institute of Technology. It happened that the first three of these values had a spread of only 0.005 °C, but the MIT value exceeded their average by 0.02 °C. This exception led some members of the committee to suspect that the large MIT value had resulted from systematic errors, and thus would justify its rejection. However, its inclusion did not change the average enough to change the preferred figure to the nearest hundredth of a degree so it was retained, and the choice was considered felicitous.

The MIT value had been an average value itself [3], obtained from experiments with different gas thermometers. Each research was as self-consistent as any of the foreign researches, but these different researches at the MIT yielded different values. This indicated that there were indeed systematic errors, but their identities were not apparent at that time.

Subsequently a value for the steam point was obtained at the Physikalisch-Technische Bundesanstalt (Germany) (PTB) in 1956 and was reported to the session of the CCT in 1971 [4], as 99.984 °C(therm). However, when a new value for the steam point 99.999 °C (therm) [5] was determined at the National Research Council (Canada) during that portion of the session of the CCT held in Ottawa (1967), the 1954 choice of 273.16 K for the triple point of water tended to be confirmed.

Between 1900 and 1954, experimentally determined values of the ice point on the Kelvin Scale have differed by almost 0.2 K. We doubt that the variation of the results obtained from different good gas thermometers can be explained by unsuspected equipment difficulties, e.g., manometry. Sorption produces a systematic error which yields too high a ratio of the value for the steam point to that for the ice point. It now seems likely that much of the variation was caused by variation in the amount of sorption. Even though it has been recognized for a century that sorption may cause errors in gas thermometry, the subtleties of sorption are such that it is by no means certain that it has yet been eliminated. As a means of reducing sorption, Chappuis baked and pumped his gas thermometer bulb [6]. The MIT gas thermometers had been evacuated for periods of a month, during a part of which time the bulbs were at 500 °C. Moser, however, asserted that the PTB constant-bulb-temperature method of gas thermometry avoided sorption errors since the temperature of the bulb is not changed [7]. That assumption was probably

[1] Figures in brackets indicate the literature references at the end of this paper.

incorrect, because with that method gas is expanded into a second bulb by withdrawing mercury, and additional cool surfaces are exposed. At the same time the reduction of pressure in the hot bulb will lead to re-equilibration of sorbable species. Despite the attention that had been given to cleanup in the foregoing researches, there is substantial variation in their results, which we interpret as due to significant but different amounts of sorption.

Varying amounts of sorption are usually involved when the fiducial state is not reproducible despite the attainment of a stable, gas-tight system. The measurements of the fiducial state were reported in detail in Chappuis' publications [8–11], in those of Day and Sosman [12], and of Beattie et al. at the MIT [13]. They were also given by Oishi [14] and discussed by Moser et al. [15], among others, and there was, in general, considerable variation. In some other gas thermometry researches, important variation of the fiducial point has occurred, but the information was not published.

High precision of the fiducial and measuring states, however, is no guarantee that sorption was absent. If either the thermometric fluid was a sorbable species, or the thermometer contained sorbable contaminants, high precision may have been obtained because the sorption was quantitatively reversible within the time scale of the measurement.

Some gas thermometers were operated both as constant volume and as constant pressure thermometers. If the different values of temperature for the same state are found to vary significantly more than the equipment uncertainties justify, the variation is likely to have been caused by sorption effects. There are numerous examples in the literature of measurements made by both modes [16], and usually they show a distinct disparity in the results.

The possibility that sorption is the largest remaining systematic error of gas thermometry has been discussed in prior publications about the NBS gas thermometer. For the present state of knowledge, the evaluation of that error depends upon experimental measurements.

In our last paper, we reported a value of 99.973 °C (therm) as realized at the steam point by our gas thermometer [17]. This value had been significantly lowered by using techniques to reduce sorption, in particular by stringent cleanup and by the choice of a nonsorbable gas for the thermometric fluid. The cleanup was effected by vacuum bakeout of the thermometer bulb at 650 to 800 °C for 4 or more weeks, with prolonged evacuation of the rest of the system. The thermometric fluid was helium, which is not expected to be adsorbed or absorbed per se. Hence, to the extent that the helium had been sufficiently purified before being introduced into a scrupulously clean system, sorbable gases were eliminated, and the gas thermometer measurements were free of significant error from sorption.

We have shown that successively improved cleanup has reduced our experimentally measured values of the thermodynamic temperature of the steam point, but we have not yet demonstrated that a better cleanup procedure might not produce a further discernible effect. This paper presents the most recent efforts to reduce any contamination that might remain in the system or that might be introduced in the gas used as the thermometric fluid. The results of this gas thermometry are shown as the differences between the thermodynamic values, as realized, and the IPTS–68 values for the same temperatures in the range $0 < t_{68} < 142$ °C.

2. Equipment

The NBS gas thermometer was operated as a "constant volume" type. It had a bulb in the shape of a right circular cylinder of platinum−12 percent rhodium, with internal dimensions of 7.620 cm in diameter and 9.972 cm in height. The sides and bottom were 0.094 cm thick, but the top was made 0.297 cm thick to give it more stiffness. The bulb was surrounded by a heavy Inconel 600 case with a uniform 0.025 cm clearance between them for a counter-pressure system. The bulb was connected by a 0.9 mm i.d. heavy-walled tube of platinum−10 percent rhodium to a valve and a pressure transducer (see fig. 1).

The pressure was determined by a mercury manometer with account being taken of the associated "pressure heads" and of the difference of pressure across a pressure transducer [18]. On the gas thermometer side the pressure transducer had a volume of about 100 mm^3, separated from the manometer side by a brass diaphragm. The diaphragm position was determined by measuring the capacitance between it and a flat electrode on the manometer side. After the initial filling, the pressure in the gas thermometer was adjusted to balance the pressure for which the manometer was set by changing the gas thermometer temperature. Large changes of the temperature of the gas thermometer were made by lifting it from one thermostated stirred liquid bath and lowering it into another and small changes of the temperature were made by changing the regulating point of the thermostat. The pressure was deemed close enough to balance if the remainder of the pressure to be accounted for (by diaphragm deflection) was 1/3 μm Hg (0.44 Pa) or less.

The thermostated baths provided an environment, stable and uniform in temperature within 0.1 mK, over the range 0 to 142 °C. The temperature was measured on the IPTS–68 by three standard platinum resistance thermometers, newly calibrated at the steam point and at the triple point of water with an a.c. resistance thermometer bridge [19].

3. Measurement of Gas Thermometer Parameters

The volume of the connecting tube (the dead space) was calculated from the measured average inner diameter of each millimeter increment in length [20]. Values of temperature corresponding to each millimeter were derived from measurements of the e.m.f. produced by platinum-platinum 10 percent rhodium thermocouples, the junctions of which were spaced every 2.54

cm from the room temperature end for 30 cm along the tube into the bath. The values of Celsius temperature were converted to the reciprocal of the thermodynamic Kelvin values, which were then fitted by an appropriate polynomial equation as a function of position. These equations were chosen to fit the data well enough that the value of reciprocal Kelvin temperature for any position could be interpolated with sufficient accuracy for either the dead space or pressure head calculations. The anticipated uncertainty in a measured thermodynamic temperature as a consequence of the combined uncertainties of temperature and volume in the dead space is less than 1 ppm even at the gold point.

Because the gas thermometer bulb was in a counterpressure system, the volume ratio for two states involved only the thermal expansion of the bulb. The volume ratio of the bulb varies with temperature as the cube of the corresponding length ratio, viz., $V/V_0 = (1+\bar{\alpha}_0^t \Delta t)^3$, where $\bar{\alpha}_0^t = \frac{1}{l_0}\frac{\Delta l}{\Delta t}$, and Δt is the difference of the temperatures in °C (Int. 1698). The linear thermal expansion was determined for samples from the same sheet of material that was used to make the bulb. These were annealed at 1000 °C for 2 h in an argon atmosphere, and then the lengths of each sample at different temperatures were determined by an interferometer [21]. A quadratic equation was fitted to the data from repeated measurements of a single sample by least squares, yielding an estimated relative standard deviation of the mean of $\pm 5 \times 10^{-7}$ in the range of 0 to 100 °C. The relative expansion of a sample taken from an earlier gas thermometer bulb after two years of operation differed from that of the average of other samples from the same sheet by 1 ppm at 100 °C. A final choice of values of thermal expansion will not be made until more measurements can be made on samples from the bulb itself. Any change of the final values is not expected to change the value of the steam point by more than 1 mK, but may change values above 100 °C by larger amounts where the values of thermal expansion are now extrapolations.

In the expression for calculating thermodynamic temperatures, the reference volume of the bulb, V_0, occurs only in the dead space term. The effect of the dead space is equivalent to about 0.033 °C at the steam point, and remains relatively small up to the gold point. Thus, the reference volume of the gas thermometer bulb need not be known better than 0.1 percent, and can be obtained with sufficient accuracy from the dimensions measured during fabrication.

4. The Residual Gas Analyzer and the Gas Handling System

A year ago we had anticipated that we would use the residual gas analyzer (RGA) to detect very low levels of impurities in a direct analysis of the thermometric fluid [17]. The RGA proved to be unsuitable because it was impossible to evaluate the concentration of sorbates evolved from its filament with sufficient accuracy. Nevertheless, the RGA was still valuable for identifying sources of sorbates from the gas thermometer system, from pump backstreaming, and from intermittent leaks. The knowledge made possible improvements in the system and in cleanup procedures. These, together with improved gas purification techniques, assured that sorption was reduced, certainly below the level needed to attain the first three criteria of cleanliness given in our previous paper [17], and possibly to an insignificant level.

Guided by the output from the RGA, we were able to reduce the concentration of sorbatesin the gas thermometer bulb. The residual impurity in the bulb at 650 °C was ultimately almost all H_2. The vacuum bakeout was considered adequate when the hydrogen pressure in the bulb was 1 nm Hg or less,[2] for, when the bulb had cooled down to 400 °C, no significant concentration of gas except helium was detectable above the system background.

Evidence derived from the RGA indicated that both CO and CH_4 were backstreaming extensively from the oil diffusion pump. (This problem will be much reduced by changing to an improved oil diffusion pump [22]). The pumping equipment was therefore augmented, so that after an initial brief pumpdown by the oil diffusion pump to remove helium, the system could be isolated from it and then evacuated by ion pumps, in cascade if desired, as shown in figure 1. As part of a second modification, valves were installed so that the ion pumps could be isolated from any part of the system used for gas handling. Thus contamination by gases, released from the ion pumps when they had to be shut down, could be avoided.

The gas purification was also improved. In the final arrangement, helium (stated to be 99.9999 percent pure) was passed through a trap of titanium metal chips at 900 °C, where chemically reactive materials would combine with the Ti to form nonvolatile compounds, with, in some cases, the release of hydrogen. The titanium itself was further source of hydrogen, which is desorbed at temperatures above 400 °C. Therefore, the next trap in the purification train contained CuO, also at 900 °C, to convert all the hydrogen into water, which was then adsorbed in a third trap onto a zeolite material (Molecular Sieve #13) held at liquid nitrogen temperature. As a result, it is expected that the emerging helium gas could contain sorbable impurities only in concentrations well below 1 ppm.

5. Measurements and Results

The measurement procedures and the development of equations have been given in detail in a previous publication [17]. The data at each temperature consist of values of gas thermometer measurements and corresponding platinum resistance thermometer readings. From these data, corresponding values of temperature on the gas thermometer scale and on the IPTS–68, respectively, are obtained. Measurements were made at a constant pressure ratio but over different pressure ranges, with the lower (fiducial) temperature close to

[2] Deduced by multiplying the observed partial pressure of H_2 observed in the RGA (1×10^{-10} mm Hg or less) by 10^3 in order to account for the resistance to flow through the connecting tube.

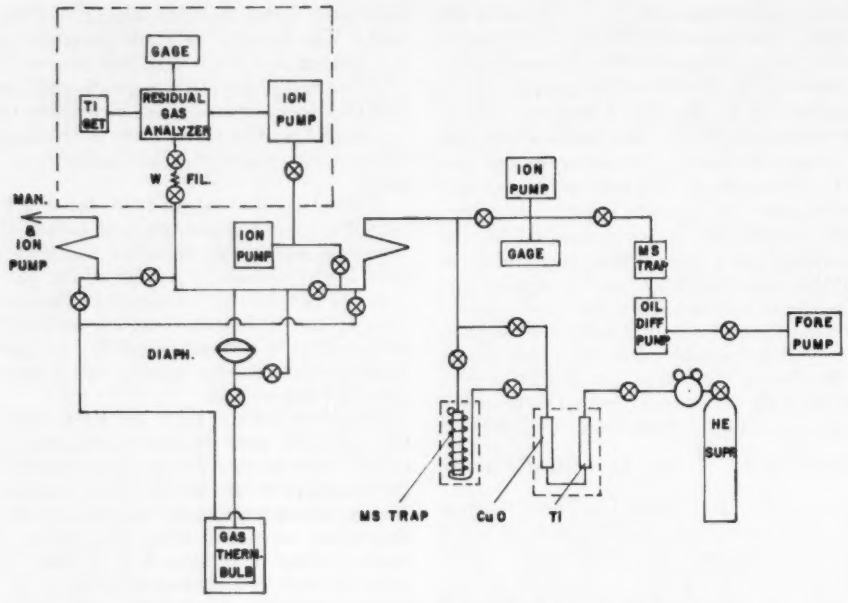

FIGURE 1. *Schematic of gas thermometer with gas handling, analysis and pumping system.*

the triple point of water. By extrapolating the difference between the corresponding values of temperature on the gas thermometer scale and on the IPTS–68 to zero measuring pressure, one obtains at the intercept the difference between the TKTS and the IPTS–68. This method of accounting for the imperfection of the thermometric fluid is applicable in this case where the manometer is capable of high accuracy even at low pressures.

It was our intent to study sources of contamination with the RGA and to improve the system until (1) the impurity level observed on the RGA was markedly reduced and (2) the measured difference between the TKTS and the IPTS–68 at given temperatures was not affected significantly by a reduction of impurity still measurable on the RGA. Rapid progress in improving the system could be made, and the process appears to have been sufficiently complete in only two steps. For the first step, the gas system was modified by installing ion pumping and a U-tube titanium trap, one leg at 900 °C and the other at 200 °C, to the gas purification train. For the second step, the vacuum system was rearranged so that the ion pumps could be isolated from the gas lines, and the improved purification train, described in the preceding section, was installed.

For the measurements of the first step, the gas thermometer was baked out until residual gas analysis indicated that the partial pressure of H_2 remaining in the bulb was about 1 nm Hg (1×10^{-4} Pa). After cooling, helium was admitted to the system and the gas thermometer was filled. Measurements were made at 0, 100, 121, and 142 °C, based on fiducial conditions of 101.6 mm Hg (1.349×10^{4} Pa) pressure at 0.01 °C (Run 20A). Further measurements in the first step were based on fiducial conditions of 560.5 mm Hg (7.441×10^{4} Pa) pressure at 0.01 °C with measurements at 0 °C and 100 °C (Run 20B) made with the same pressure ratio as used in Run 20A for 100 °C. The results for the steam point are shown in figure 2; the previously presented [17] results of Runs 16–19, also at the steam point, are included for comparison.

For the measurements of the second step, the gas thermometer was again baked out at 650 to 800 °C, and then it was filled with purified helium in an amount corresponding to fiducial conditions of 101.6 mm Hg (1.349×10^{4} Pa) pressure at 0.01 °C. Gas thermometer measurements were made at 0 °C and at approximately 20 °C intervals up to 142 °C, and were repeated up to 100 °C (Run 21).

The difference at each measuring temperature between the values on the gas thermometer scale and the IPTS–68 is shown versus t_{68} in figure 3 for both Runs 20A and 21. Since the results of the two runs appeared to be indistinguishable, a polynomial was fitted to the values by least squares as

$$t_{GT}-t_{68}=at_{68}+bt_{68}^2+ct_{68}^3\ ^\circ\mathrm{C},$$

where

$$a=-0.162217\times10^{-3}$$
$$b=-0.204508\times10^{-5}\ ^\circ\mathrm{C}^{-1}$$
$$c=0.608088\times10^{-8}\ ^\circ\mathrm{C}^{-2} \qquad (1)$$

with an estimated standard deviation of the mean of

$$S=0.98\times10^{-3}\ ^\circ\mathrm{C}.$$

The scatter in Run 20A and Run 21 is larger than typical for the NBS gas thermometer. It occurred pri-

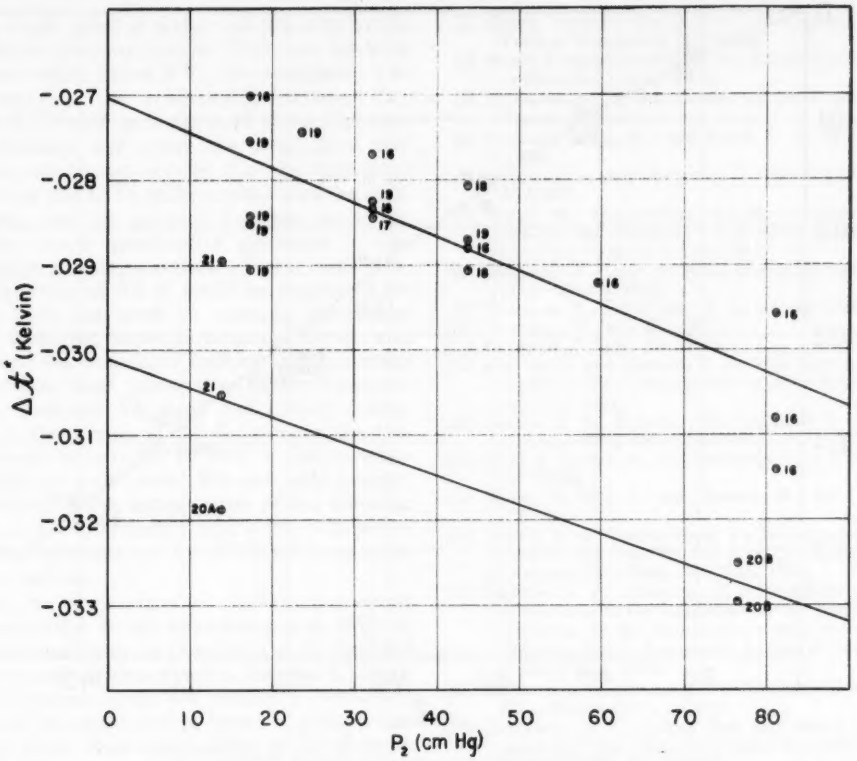

FIGURE 2. *Extrapolation of gas thermometer–international scale differences to eliminate effects of gas imperfection.*

marily because, at the low fiducial pressure used in these runs, a lower than usual sensitivity of the diaphragm made it impossible to detect a pressure balance with the same relative accuracy as is possible at a higher fiducial pressure. The three points enclosed by ellipses were excluded as "outlyers" on the basis that their deviation was inconsistently large for the number of points and the standard deviation. During Run 21, there were three measurements at the fiducial state which, reduced to a common basis, correspond to an average temperature of 0.00339 °C with an average deviation of ±0.00057 °C.

The effects of gas imperfection are small and approximately linear with t_{68} for the range 0 to 142 °C. Using the slope of the line in figure 2 to evaluate the difference at 100 °C, we can express the difference between the TKTS and the gas thermometer temperature scale as

$$t_{th} - t_{GT} = 4.739 \times 10^{-6}\, t_{68}\ ^\circ\mathrm{C} \qquad (2)$$

for a fiducial pressure of 101.6 mm Hg (1.349×10^4 Pa) at 0.01 °C. Hence

$$t_{th} - t_{68} = a' t_{68} + b t_{68}^2 + c t_{68}^3 \qquad (3)$$

where $a' = -0.157478 \times 10^{-3}$ and b and c are as before. From these values of the constants, the calculated value of the steam point is 99.970 °C(therm), with an uncertainty of ±3.5 mK at the 99 percent confidence level.[3]

6. Discussion

Different purities are involved in the results presented in figure 2. The subsets formed by Runs 16–19 and Runs 20A–20B are each self-consistent, presumably as a result of uniform procedures within each subset. Furthermore, the subsets have an important element of consistency with respect to each other in that the slopes of the two lines are identical within experimental error. We think this feature has existed with other gas thermometry—that the data tend to be self-consistent

[3] The uncertainty figure was derived from the root of the sum of the squares of the following

	ppm
Estimate of the relative standard deviation of the mean of the fit to eq (1)	2.63
Estimate of the relative standard deviation of the mean of the thermal expansion	1.5
Estimate of the relative uncertainty of the dead space effect (1 standard deviation)	0.3
Estimate of the relative uncertainty of the gas imperfection correction (1 standard deviation)	0.3
Estimate of the relative uncertainty of the pressure ratio in addition to the first item (1 standard deviation)	0.5
Estimate of the total relative standard deviation of the steam point:	3.1
Estimate of the total relative uncertainty of the steam point at the 99 percent confidence level (3 standard deviations): 9.3 ppm or 3.5 mK	

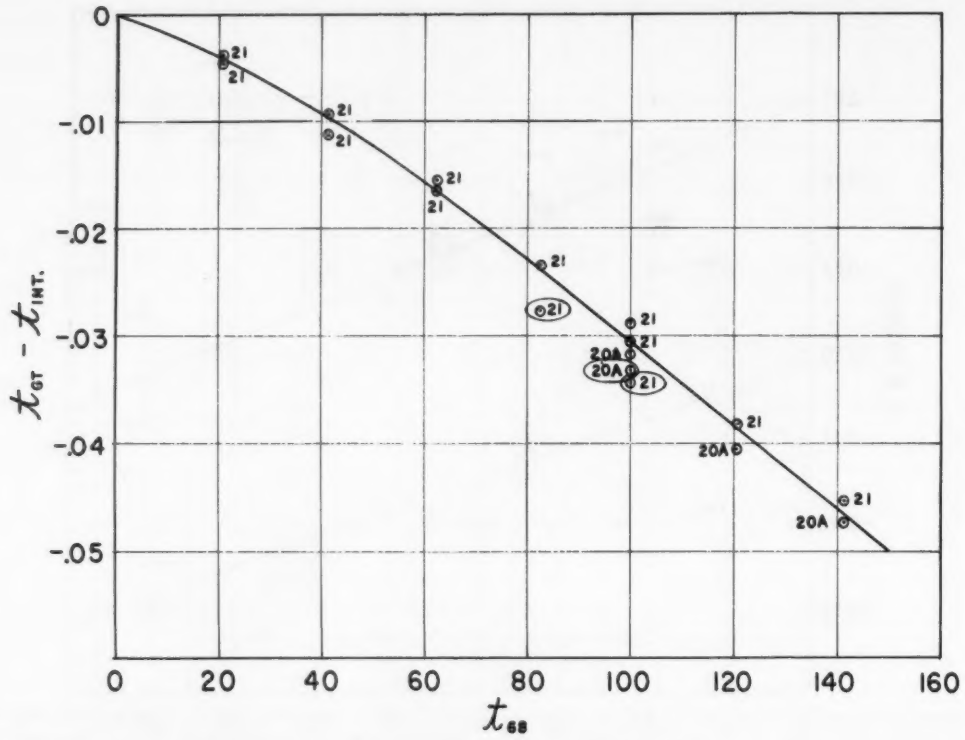

FIGURE 3. *Gas thermometer—international scale differences as a function of temperature.*

Solid line represents eq (1). Measurements are based on a fiducial pressure of 101.6 mm Hg at 0.01 °C.

because the experimenter maintained about the same level of gas purity by uniform experimental procedures, and that an approximately proportional displacement occurs for a different level of gas purity.

The measurements of Runs 16–19 were already made at a high level of system cleanliness, but means for further improvement were then developed with the help of the RGA. The displacement of the results of Runs 20A–20B from Runs 16–19 demonstrated that the improvement was significant. A further enhancement of gas purity was expected as a result of changes in the system and the procedures introduced between Runs 20 and 21, but it was expected to be small. In fact, as shown in figure 3, no effect on the results is evident. It is our opinion that the sorption in Runs 20 and 21 is sufficiently small that more cleanup is not likely to cause a significant shift of the values, and is most unlikely to be as large as 2 mK at 100 °C.

The effect of sorption, illustrated by this and our last paper [17], offers an explanation of the discrepancies which the CCT encountered in 1954 (and which must have existed for earlier gas thermometry as well). The first MIT work was carried out with vitreous silica bulbs and a thermometric fluid of nitrogen. The value of the ice point found as the average of two thermometers was $T_0 = 273.166$ K, where the results of the other three laboratories gave an average of 273.147 K. For later work at the MIT, the gas thermometer bulb was made of Jena glass (1565^{III}), and the thermometric fluid was helium. The values of the ice point found in three researches, one in 1943, and two in 1952, were still higher, with values of 273.174, 273.188 and 273.191 °C. (The equivalent values from our results reported in our last paper and in this paper would be 273.222 and 273.232 K, respectively). The procedures used in the MIT work should have resulted in an enhanced system cleanliness over that of prior researches, and the use of helium should have reduced the effects of sorption relative to nitrogen. It appears to us that, of the values of the ice point realized up to 1954, none was high enough, but those of the MIT were the best.

The results of this research demonstrate that the TKTS differs much more from the IPTS–68 than was believed when the CCT assigned a value to the steam point of 100 °C, with a possible difference of 0.005 K from the thermodynamic value [24]. Any sorption that is uncorrected for must also affect the realization of the thermodynamic scale in other ranges of temperature. If systematic errors from sorption are the dominant uncertainty in the values adopted for the fixed points of IPTS–68 (a likely possibility in our view), the numbers below the triple point of water will prove to be too low,

and above the triple point of water will prove to be too high on the thermodynamic scale. While we have no plans for measurement below 0 °C, the equipment was designed to measure the relationship between the TKTS and the IPTS–68 up to the gold point. The next set of measurements will cover the range from 160 to 450 °C. It seems almost certain that the departure of the TKTS from the IPTS will increase with increasing temperature, but the present evidence available fails to provide much quantitative guidance. If the effects of sorption are approximately linear with temperature, a difference of 0.3 K could be projected for the gold point from our work–a value in agreement with the total radiation measurements of Blevin and Brown at the National Standards Laboratory (Australia) [25]. On the other hand, spectral radiation measurements at the National Physical Laboratory (Great Britain) show a divergence of 0.5 K between the two scales over a range of only 720 to 1064 °C [26], consistent in sign with our own work. We can only conjecture that the value of the temperature of the freezing point of gold on the thermodynamic scale will prove to be lower than the value on the IPTS–68 by at least some tenths of a kelvin.

Even though the thermodynamic scale as a concept is exact, its realization in the laboratory is so difficult that the international scale in practice can be realized much more precisely. Consequently, improved knowledge of thermodynamic scale will remain a continuing goal, and it must be expressed in terms of a more certain laboratory scale. New realizations of the thermodynamic scale need not, and should not, be regarded as justifying modification of the international scale. Next to its exactness and universality, the invariance of the international scale is its most important quality. As improved realizations of the thermodynamic scale appear, they can then be recognized by adopting values of differences from the IPTS. Thus, even though conceptually the thermodynamic scale is fixed by the assignment of the value of 273.16 K to the triple point of water, and in principle the international scale may be changed, in practice the international scale can and should be held constant, while our understanding of the thermodynamic scale as realized experimentally will inevitably change.

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An Alumina Standard Reference Material for Resonance Frequency and Dynamic Elastic Moduli Measurement

II. Characteristic Values for Use from 25° C to 1000° C

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(February 16, 1973)

The temperature dependence of Young's modulus and the shear modulus of polycrystalline alumina is given over the range of 25 to 1000 °C. Results are expressed in terms of the dimensionless ratio: modulus value at temperature divided by modulus value at 25 °C. These results are intended for use with Standard Reference Material No. 718 which is intended for calibration of apparatus used to determin elastic moduli of solids by a resonance technique. The worst agreement is 9.5×10^{-4} for the flexure and 19.1×10^{-4} for the torsion, between any two individual measurements, and we recommend these as the minimum acceptable limits in using the standards.

Key words: Alumina; elastic modulus; resonance frequency; shear modulus; standard reference material; Young's modulus.

1. Introduction

The elastic moduli of homogeneous, isotropic, solids are often calculated from the resonance frequencies of a slender bar or rod of the material excited in either flexure or torsion [1][1]. In principle the moduli are calculated directly from the resonance frequencies and the dimensions and density of the sample. However, as discussed in Part I [2], the corrections required for the effect of loading or damping by the suspensions and the atmosphere are difficult to calculate, and it is frequently convenient to have available a standard bar whose resonance has been accurately determined to use in order to estimate or confirm the errors in a particular experimental apparatus.

To meet this need, NBS has made available a series of carefully prepared bars of polycrystalline alumina whose fundamental resonance frequencies in free vibration in both torsion and flexure have been measured. In Part I the bars themselves and the room temperature measurements are described. In this section we report the results of measurements as a function of temperature from room temperature to 1000 °C. At the higher temperatures it is very laborious to ensure that the temperature throughout the sample is uniform and equal to that measured, since the sensing instrument cannot be in direct contact with the sample without causing additional changes in resonance frequency. Fortunately it proved unnecessary to measure the temperature variation of each bar in the set since the ratio of the resonant frequencies at two temperatures is almost identical for all bars in the set. This was demonstrated by comparing the ratios measured on two bars, A–1 and C–7, whose densities and resonant frequencies are close to the minimum and maximum values for the set (the densities of 88% of all bars fall between the densities of these two samples).

By expressing the temperature variation in terms of ratios of resonant frequencies instead of the frequencies themselves, many of the corrections which would be very difficult to apply at high temperatures become insignificant. Hence the attention in this work could be concentrated on (1) suspending the specimen in a furnace in such a way as to obtain a good response, and (2) maintaining the test specimen at a fixed temperature and measuring that temperature accurately. The principle source of error of the frequency ratios is the measurement of the test temperature.

2. Experimental Procedure

The ratio of Young's and shear moduli at temperature T ($Y_T G_T$) and reference temperature of 25 °C ($Y_0 G_0$) is given in terms of the corresponding frequency ratio, $F_i^T (= f_i^T / f_i^0$, with $i = Y$ or G) by

$$Y_T/Y_0 = (F_Y^T)^2 \frac{l_0}{l_0 + \Delta l}; \; G_T/G_0 = (F_G^T)^2 \frac{l_0}{l_0 + \Delta l},$$

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[1]Figures in brackets indicate the literature references at the end of this paper.

where $\frac{\Delta l}{l_0}$ is the relative change in linear dimensions of the sample between the reference temperature and the temperature of measurement. This equation is equivalent to that given by Ault and Ueltz [3] for calculating Young's modulus and discussed by Spinner [4] for the general case including both Young's and shear moduli.

In order to establish the validity of the assumptions stated in the previous section concerning the advantages of using the parameter (F_1^T), and to provide an independent crosscheck, the two bars, A–1 and C–7, were run on the apparatus at the National Bureau of Standards, and bar A–1 was also run using a similar type apparatus at the Lamont-Doherty Geological Observatory (LDGO). The electronic apparatus used by the Bureau was described in Part I [2]. Differences arose in the method of suspending the specimen, arrangement of thermocouples, and furnace design. Platimum-Platimum + 10 percent Rhodium thermocouples were used as temperature sensors, in conjunction with a sensitive potentiometer. The arrangement used at NBS will be described first. The furnace used was a platinum wound tube furnace designed to provide a wide zone of constant temperature both axially and radially. The furnace was enclosed in a water-cooled gas tight jacket. The specimen was suspended from the driver and pickup needles with fine nichrome wire as shown in figure 2 of Dickson and Spinner [5]; the position of the suspending wires on the specimen was as described in Part I [2]. The measurements were performed in argon under a pressure of 1 mm Hg for the reasons described in Part I. The thermocouple arrangement for the calibration runs and the data runs were as follows:

Four thermocouples were used, three for monitoring and one for controlling the furnace temperature. Both the control thermocouple and the principal monitoring thermocouple were located near the center of the specimen and approximately 5 mm below it; the secondary monitoring thermocouples were located below and near the ends of the specimen. Prior to the frequency determinations a dummy alumina specimen of the same nominal dimensions as the standard bars was suspended in the manner and position which were to be used for the frequency determinations, but substituting thermocouples for the nichrome suspension wires. The beads of these thermocouples were in contact with the specimen, allowing the actual specimen temperature to be observed. The furnace was then closed and the temperature distribution observed over the range of interest under varying pressures of argon. The small gradients observed varied with both temperature and gas pressure, 200 mm pressure of argon was chosen for the frequency determinations as being the most suitable over the entire temperature range of interest. A correction to be applied to the temperature observed with the monitoring thermocouples was then determined which was used during the frequency determinations to convert observed temperature to specimen temperature. This correction was a smoothly varying function of temperature with a maximum value of 5.7 °C.

A standard bar with the normal suspension was then introduced into the furnace and the flexural and torsional resonance frequencies determined over the temperature range of interest. Care was taken to fill the aperture through which the suspension wires entered the furnace as completely as possible with fire brick to minimize the temperature gradients. With the long wire suspensions some difficulty was encountered with spurious resonances in the system; for a given suspension these were troublesome only over a limited temperature range. To overcome this, the suspect data were carefully weeded out and the frequencies redetermined until valid data were obtained over the entire range.

Since different suspensions gave slightly different reference temperature values for the frequency, the data were analyzed in terms of $(Ff)^2$, the quantity of interest. To do this, a straight line was arbitrarily chosen to pass through 1.000 at 25 °C and the approximate value of $(Ff)^2$ at 1000 °C. The difference between the observed values of $(Ff)^2$ and this straight line was at no point greater than 0.003 and when plotted versus temperature, yielded a set of points to which a smooth curve could be fitted by eye. The values given in table I were obtained from the curves thus obtained.

The furnace used at LDGO was a glo-bar box furnace with a six inch zone of constant temperature. The specimen was suspended from above using fine nichrome wires as shown in figure 1 of Dickson and Spinner [5] and located slightly displaced from the nodal positions for flexure. While this procedure introduces a slight shift in the measured frequency from that for free vibrations, it does not constitute an error in the normalized frequency since this is relatively insensitive to the position of the suspending fibers so long as their position remains constant throughout the experiment. In this apparatus, the runs were performed in air at 1 atm pressure. Thus a cross check was provided on the pressumed elimination of loading effects in the normalized frequency data. Four thermocouples were employed. One was placed at each end of the specimen to check on the thermal gradient across the length of the specimen. These were wired to yield a differential output. The third and fourth thermocouples were tied together and located at the middle and slightly above the specimen. One of these was used to determine the specimen temperature, the other to operate the temperature controller unit. All four thermocouples were positioned to within $\frac{1}{4}$ in of the specimen. Considerable care was taken in suspending the specimen in the furnace and locating the thermocouples, particularly after replacing the insulation into the opening through which the specimen and thermocouples were emplaced. This was facilitated by the design of the furnace which had removable bricks at the ends, allowing access for making minor adjustments in locating the specimen and thermocouples after all other components were in place. All furnace openings were completely covered with insulating

TABLE 1. *Dependence of normalized frequencies of standard alumina bars on temperature*

Temp. °C	$F_Y^T=(f/f_{25})^2$ from flexure: C-7 NBS	A-1 NBS	A-1 LDGO	Av.	Maximum spread of values $\times 10^4$	$F_G^T=(f/f_{25})^2$ from torsion: C-7 NBS	A-1 NBS	A-1 LDGO	Av.	Maximum spread of values $\times 10^4$
25	1.00000	1.00000	1.00000	1.00000	–	1.00000	1.00000	1.00000	1.00000	–
100	0.99198	0.99198	0.99211	0.99202	1.3	0.99186	0.99120	0.99093	0.99133	9.3
200	.98103	.98087	.98122	.98104	3.5	.97968	.97896	.97907	.97923	7.2
300	.96969	.96937	.96991	.96965	5.4	.96692	.96639	.96695	.96675	5.6
400	.95781	.95744	.95822	.95782	7.8	.95392	.95357	.95426	.95391	6.9
500	.94564	.94531	.94620	.94571	8.9	.94069	.94059	.94089	.94072	3.0
600	.93321	.93302	.93390	.93337	8.8	.92732	.92734	.92693	.92719	4.1
700	.92063	.92065	.92139	.92089	7.6	.91393	.91394	.91265	.91350	12.9
800	.90795	.90819	.90875	.90829	8.0	.90033	.90048	.89857	.89979	19.1
900	.89518	.89530	.89597	.89548	7.9	.88653	.88690	.88533	.88628	15.7
1000	.88231	.88225	.88320	.88258	9.5	.87279	.87319	.87377	.87325	9.8

TABLE 2. *Dependence of the elastic modulii of standard reference alumina bars upon temperature*

Temp. °C.	$\Delta l/l_0$ In Units of 10^{-4}	Flexure $F_Y^T=(f/f_{25})^2$	Young's modulus ratio (Y/Y_{25})	Torsion $F_G^T=(f/f_{25})^2$	Shear modulus ratio (G/G_{25})
25	0.00	1.00000	1.00000	1.00000	1.00000
100	4.63	.99202	.99156	.99133	.99087
200	11.57	.98104	.97991	.97923	.97810
300	19.24	.96965	.96779	.96675	.96489
400	27.36	.95782	.95521	.95391	.95131
500	35.80	.94571	.94234	.94072	.93736
600	44.47	.93337	.92924	.92719	.92308
700	53.29	.92089	.91601	.91350	.90866
800	62.24	.90829	.90267	.89979	.89422
900	71.19	.89548	.88915	.88628	.88002
1000	80.19	.88258	.87556	.87325	.86630

bricks and small openings stuffed with fiberfax insulation to minimize convective air circulation which could perturb the measurement.

Measurements were performed at different temperatures between 0 and 1000 °C. The furnace was held at a temperature until there was no further change in the frequency measurement (this was far more sensitive to small thermal changes than the thermocouples used) and the furnace had equilibrated at that temperature. The specimen temperature, differential output of the two end thermocouples, and frequency, first flexure then torsion, were obtained. Frequency was measureable to a reproducibility of at least one part in ten thousand, at a fixed temperature. Frequency measurements were performed with increasing and also decreasing temperature. The maximum deviation in temperature between the ends of the bar was about 2 °C and occurred at 500 °C. Near room temperature the deviation was 0.1 °C, while at 950 °C it was 1 °C.

The LDGO data were determined at 27 different temperatures. The frequency data for each mode were computer fitted to a polynomial expansion using a least square technique. The computer program employed for this purpose progressively increases the number of terms in the polynomial until one yielding the smallest errors is found, and the frequencies for the two modes are then calculated at selected temperatures using this polynomial.

3. Experimental Results and Discussion

Table 1 lists the values of $(F_i^T)^2$ calculated for selected values of temperatures. Results are listed for the two bars (C–7 and A–1) measured at NBS and the results for bar A–1 determined at LDGO. The uncertainty assigned to the average values of the normalized frequency is the maximum spread of the values reported in the three sets of measurements.[2] The Young's modulus and shear modulus based on the data presented in table 1 are given in table 2. The values of $\Delta l/l_0$ for polycrystalline alumina is from Wachtman et al [6]. In using the NBS elasticity standards we recommend that measurements be compared directly with the frequency data reported in table 1, as the moduli values also contain errors due to the thermal expansivity data, and the errors in the room temperature determination of the Young's and shear moduli.

The very close agreement of the results obtained with bars C–7 and A–1 at the same laboratory support our earlier statement that these data adequately describe the high temperature elastic properties of all

[2] The word "uncertainty" as used in this paper, means an *estimated* total uncertainty derived from the consideration of possible sources of error in all the measurements involved in the determination of the studied property. The estimation is generally based on previous knowledge of the measuring process involved; the estimates are not expressed in terms of exact statistical measures, such as standard deviations, because they comprise both random and systematic errors and are partly based on judgment rather than on repetitive measurements of the same quantity.

the NBS test bars described in Part 1 [6]. On the basis of the interlaboratory results, it would appear that deviations between results on the same bar at different laboratories may be greater than deviations measured on any bars in the set of elasticity standards when measured in the same laboratory. The worst agreement is 9.5×10^{-4} for the flexure and 19.1×10^{-4} for the torsion, between any two individual measurements, and we recommend these as the minimum acceptable limits in using the standards.

The advantage of using the normalized frequency data for reference measurements is apparent in an examination of the data. Although different furnace designs, thermocouple arrangement, and loading conditions were employed at the two laboratories, these effects were removed by the process of normalization. However, it should be emphasized that considerable attention must be given to the furnace design, suspension, and thermocouple locations if satisfactory calibrations are to be obtained.

4. Availability of Standard Bars

This material is now offered by the National Bureau of Standards as Standard Reference Material number 718. Bars are now available from the Office of Standard Reference Materials, Room B314, Chemistry Building, National Bureau of Standards, Washington, D.C. 20234.

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Heat Capacities of Polyethylene from 2 to 360 K. I. Standard Samples of Linear and Branched Polyethylene Whole Polymer

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(March 14, 1973)

Heat capacities of two well characterized polyethylene samples have been measured from 2 to 360 K in a precision vacuum adiabatic calorimeter. The two samples are derived from the same stocks from which NBS standard reference materials (SRM) 1475 and 1476 for linear and branched polyethylene whole polymers, respectively, were established. Both samples have been studied in the conditions as received. The branched polyethylene sample has also been studied following various thermal treatments in the calorimeter. The effect of thermal history on the behavior of branched polyethylene has also been studied by differential scanning calorimetry.

Key words: Branched polyethylene; calorimetry; glass transition; heat capacity; linear polyethylene; polyethylene; thermal analysis; thermodynamic properties.

1. Introduction

Polyethylene is the simplest hydrocarbon chain polymer composed of methylene groups. This basic polymer has been the most widely used and studied polymer. There are no less than twenty papers [1–21][1] concerning the experimental heat capacity behavior of polyethylene of various origins and treatments. However most of the research papers present their results mainly or entirely in graphs [1, 2, 5, 6, 7, 10, 11, 13, 16, 18], in simple (linear or quadratic) analytical equations [1, 8, 12, 21] or in tables of smoothed values [3, 4, 9, 14, 15, 19, 20]. Hence even if the data is of high precision some fine features will be lost in the smoothing procedures and representations. Only one paper [17], concerning heat capacities of polyethylene samples below 30 K, listed the actual heat capacity data. Partial listing of the heat capacity data above 320 K appeared in another paper [21].

The present paper reports detailed investigations by precision adiabatic calorimetry from 2 to 360 K on two well characterized polyethylene samples in their as-received conditions. Over most of the temperature range investigated, the precision of the calorimetric measurement is better than 0.1 percent. These two samples are available as the National Bureau of Standards (NBS) standard reference materials (SRM) 1475 and 1476 for linear and branched polyethylene whole polymer, respectively. They are intended primarily as characterization standards for molecular weights and rheological properties.

Subsequent papers in this series will deal with the heat capacity behavior of densified linear polyethylene samples, the detection of the glass transformation in partially crystalline polyethylene, the deduction of heat capacity of 100 percent crystalline linear polyethylene, and a comparison of the heat capacity behavior of polyethylene from various origins and investigations.

2. Experimental Detail

2.1. Calorimetric Technique

Heat capacity measurements on the two polyethylene samples were performed in the vacuum adiabatic calorimeter described previously [22] with major modifications noted elsewhere [23]. The measuring procedures and methods of data treatment were discussed in more detail in another paper [24].

A calibrated platinum resistance thermometer was used to interpolate the temperature according to the International Practical Temperature Scale of 1968 [25, 26] above 13.81 K. Below 13.81 K the platinum thermometer was compared against a germanium resistance thermometer which has been calibrated in accordance with the NBS 1965 (2–20 K) provisional scale [27]. From this comparison, a fifth-degree polynomial [28] was generated to interpolate the temperature of the platinum thermometer below 13.81 K.

2.2. Material

Both calorimetric samples of the linear and of the branched polyethylene were taken from the stocks

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[1]Figures in brackets indicate the literature references at the end of this paper.

from which NBS standard reference materials (SRM) 1475 and 1476, respectively, were established.

a. Linear Polyethylene

The Certificate for SRM 1475, Linear Polyethylene (Whole Polymer) gives the following information. The weight-averaged molecular weight, M_w, is 52,000 as determined by light-scattering in 1-chloronaphthalene at 135 °C. Gel permeation chromatography gave a value of M_w as 53,070 with the ratio $M_z:M_w:M_n = 7.54:2.90:1$. The methyl group content is 0.15 methyl groups per 100 carbon atoms. The limiting viscosity numbers (*dl*/g) are 0.890, 1.010, and 1.180 in 1-chloronaphthalene, 1,2,4-trichlorobenzene and decalin, respectively, at 130 °C with a pellet to pellet coefficient of variation of 3 percent. This sample has an ash content of 0.002 percent. No volatiles were detected by a gas-chromatographic procedure capable of detecting 0.5 percent volatiles. The manufacturer of this sample added to the polymer 111 ppm of the anti-oxidant, *tetrakis*[methylene-3-(3′,5′-di-*t*-butyl-4′-hydroxyphenyl)propionate] methane. The density reported in the certificate is 0.9784_4 g cm^{-3} at 23 °C, as determined by ASTM Method D1505–67 on a sample prepared by Procedure A, ASTM Method D1928–68. This density is obtained after a pretreatment of the sample and therefore differs from the density of the sample as received. Detailed reports on the investigations required for the certificate are described in a collection of papers [29].

The calorimetric sample for the linear polyethylene (SRM 1475) in the as received condition was composed of ellipsoidal pellets about 2–3 mm in diameter and about 3–5 mm in length. No treatment was applied to the sample before the heat capacity measurement. The density of the sample before the calorimetric measurement was 0.954 g cm^{-3} at 23 °C with a variation of ±0.001 g cm^{-3} as determined by a flotation method in an ethanol-water mixture. After the heat capacity measurement, the density of the calorimetric sample was determined again. No change, greater than the initial variation, was found in the density from that of the sample before the calorimetric measurement. The variation in the density of the sample after the calorimetric measurement is however reduced to about 0.0005 g cm^{-3}. The density measurements were performed on no less than ten randomly chosen pellets from each of the samples.

The mass of the calorimetric sample was 78.572 g in vacuo, which corresponds to 5.6015 base mole or gram formula weight of methylene group, $-CH_2-$. The density values of 0.954 and 0.00117 g cm^{-3} for the sample and for the air, respectively, were used to estimate the buoyancy correction. The top of the sample container was soldered on with In-Sn solder while the container was surrounded with a water jacket, so that the sample was not heated above the ambient temperature during the soldering process. Helium gas at a pressure of 10 cm Hg was sealed in to facilitate the thermal conduction within the sample container.

b. Branched Polyethylene

The certificate for SRM 1476, Branched Polyethylene (Whole Polymer) gives the following information. The limiting viscosity numbers (*dl*/g) are 0.8132, 0.9024, and 1.042 in 1-chloronaphthalene, 1,2,4-trichlorobenzene and decalin, respectively, at 130 °C. No pellet to pellet variation in limiting viscosity number was found. The melt index is 1.19 g/10 min. The density is 0.9312 g cm^{-3} at 23 °C as determnied by previously mentioned ASTM procedures. The manufacturer of this sample has added to the polymer 50 ppm of the antioxidant, 4,4′-thio-*bis*(6-*t*-butyl-3-cresol).

The calorimetric sample for the branched polyethylene was taken from the same stock from which SRM 1476 was established. The material was in the shape of cylindrical pellets, about 3 mm in diameter and 2–3 mm in length. The initial density of the sample before the calorimetric measurement was 0.9247 g cm^{-3}, at 23 °C with a variation less than 0.001 g cm^{-3} by flotation method. The final density of the sample after the heat capacity measurement was 0.9272 g cm^{-3} with a variation of less than 0.0005 g cm^{-3}.

The mass of the calorimetric sample was 66.258 g in vacuo which corresponds to 4.7236 base mole or gram formula weight of methylene group, $-CH_2-$. The density values of 0.925 and 0.00117 g cm^{-3} for the sample and for air, respectively, were used to estimate the buoyancy correction. Precautions were taken so as not to alter the condition of the sample from that as received. The top of the container was soldered on with In-Sn solder while the container was surrounded with a water jacket to prevent heating of the sample. Helium gas at a pressure of 10 cm Hg was sealed in to aid the thermal conduction within the container.

3. Results

The results of the heat capacity measurements are tabulated in table 1 and shown graphically in figure 1. The table is arranged in the order of increasing initial temperature of a series of heat capacity determinations. The series are numbered in chronological sequence in order to facilitate the tracing of thermal history of the sample. The temperature increment for a heat capacity determination may be inferred from the differences in the mean temperatures of the adjacent determinations within the series. Curvature corrections have been added to correct for the effect of the finite temperature rise of a determination [30].

TABLE 1. *Heat capacities of polyethylene*
(base mole [$-CH_2-$] = 14.027)

T,K	C_p, J/K mol	T,K	C_p, J/K mol	T,K	C_p, J/K mol
I. Linear Polyethylene (SRM 1475 As Received)					
SERIES VI		**SERIES V**		**SERIES VIII**	
2.32	.0020	47.15	4.259	253.16	21.07
3.12	.0055	51.16	4.774	**SERIES IX**	
4.20	.0143	55.89	5.359	262.66	22.01
5.29	.0291	61.44	6.008	272.24	23.03
6.33	.0492	67.41	6.662	**SERIES IV**	
7.40	.0770	**SERIES II**		265.49	22.33
8.53	.1136	73.12	7.252	**SERIES X**	
9.69	.1599	79.78	7.890	282.30	24.07
10.86	.2141	87.35	8.563	**SERIES XI**	
12.02	.2767	96.19	9.286	291.59	24.99
13.18	.3479	105.82	10.01	301.15	25.98
14.41	.4285	115.56	10.70	310.78	27.03
15.81	.5349	125.36	11.38	**SERIES XII**	
17.37	.6630	135.25	12.08	320.21	28.15
19.05	.8139	145.15	12.81	329.93	29.47
20.83	.9866	**SERIES III**		**SERIES XIII**	
22.75	1.186	147.08	12.97	339.34	30.73
24.96	1.430	157.14	13.71	348.93	32.43
27.47	1.722	167.25	14.42	357.00	33.97
SERIES VII		177.34	15.12		
4.68	.0200	187.31	15.80		
5.56	.0335	197.20	16.47		
6.35	.0497	207.01	17.14		
7.18	.0709	**SERIES I**			
8.20	.1017	212.27	17.52		
9.17	.1380	222.16	18.26		
10.16	.1804	231.95	19.08		
11.21	.2321	241.73	19.99		
12.30	.2931	251.40	20.89		
13.40	.3621	260.88	21.83		
14.58	.4410				
15.95	.5458				
17.48	.6722				
19.21	.8294				
21.18	1.019				
23.33	1.247				
25.73	1.516				
28.38	1.828				
31.21	2.178				
34.29	2.575				
37.73	3.024				
41.45	3.513				
45.55	4.049				
50.06	4.630				

TABLE 1. *Heat capacities of polyethylene*—Continued
(base mole [$-CH_2-$] = 14.027)

T,K	C_p, J/K mol	T,K	C_p, J/K mol	T,K	C_p, J/K mol
II. Branched Polyethyelene (SRM 1476)					
II.a As Received					
SERIES VII		**SERIES III**		**SERIES II**	
2.29	.0031	74.66	7.469	233.46	20.68
3.06	.0074	81.87	8.144	243.62	22.12
3.95	.0172	90.03	8.855	253.36	23.63
4.80	.0315	99.41	9.616	262.87	25.10
5.72	.0532	109.38	10.38	**SERIES VIII**	
6.64	.0820	**SERIES IV**		265.72	25.53
7.56	.1160	114.88	10.79	275.32	26.92
8.47	.1568	124.43	11.49	**SERIES IX**	
9.37	.2024	134.11	12.19	284.78	28.29
10.31	.2558	143.95	12.92	294.45	29.48
11.36	.3220	153.84	13.67	304.10	30.97
12.56	.4064	163.81	14.43	313.59	33.30
13.91	.5080	**SERIES V**		**SERIES I**	
15.38	.6318	172.38	15.10	300.30	30.07
17.04	.7822	182.13	15.86	309.79	32.50
18.90	.9639	192.01	16.65	**SERIES X**	
20.91	1.173	201.89	17.47	317.85	33.79
23.03	1.406	211.68	18.35	328.02	36.71
25.24	1.661	**SERIES VI**		337.93	39.08
27.57	1.939	211.68	18.38	347.52	43.35
30.13	2.253	221.73	19.44	355.68	47.76
32.98	2.614	231.54	20.52		
36.25	3.033				
40.01	3.516				
44.30	4.060				
49.08	4.659				
54.31	5.294				
60.11	5.961				
66.73	6.672				
II.b. Stabilized at 360 K and then Quenched					
SERIES XI		**SERIES XVII**		**SERIES XVIII**	
25.46	1.680	203.28	17.67	298.63	30.66
28.04	1.990	213.11	18.54	308.09	32.16
30.93	2.345	223.06	19.51	317.88	33.97
34.17	2.758	232.98	20.58	327.73	36.18
37.74	3.217	242.74	21.92	337.54	37.90
42.03	3.765	252.30	23.35	346.43	38.71
46.94	4.395	261.76	24.78	352.88	40.09
52.16	5.038	271.05	26.14	357.72	42.51
57.77	5.690	280.37	27.36	**SERIES XII**	
63.77	6.356	289.70	29.06	304.59	31.66
70.55	7.059	**SERIES XIV**		314.17	33.36
78.18	7.797	206.63	17.92	323.86	35.53
SERIES XIII		216.56	18.86	333.48	37.35
87.07	8.607	226.49	19.84	343.21	38.48
96.56	9.385	233.45	20.60	**SERIES XV**	
106.47	10.16	237.44	21.13	316.39	33.91
116.25	10.89	241.41	21.68	326.30	35.92
SERIES XVI		245.38	22.30	336.17	37.66
154.85	13.75	249.32	22.85	346.02	38.63
164.67	14.51	253.24	23.47	355.35	41.43
174.37	15.26	260.14	24.52		
183.97	16.03				
193.58	16.80				

TABLE 1. *Heat capacities of polyethylene*—Continued

(base mole [$-CH_2-$]= 14.027)

T,K	C_p, J/K mol	T,K	C_p, J/K mol	T,K	C_p, J/K mol
II.c. Annealed at 230 K					
SERIES XXI		SERIES XXII		SERIES XXIV	
2.17	.0024	65.55	6.551	201.74	17.34
2.79	.0057	71.45	7.155	211.65	18.27
3.65	.0129	78.60	7.843	221.54	19.22
4.66	.0282	87.31	8.619	231.40	20.34
5.66	.0505	96.91	9.411	241.17	21.63
6.63	.0794	SERIES XX		SERIES XIX	
7.57	.1140				
8.49	.1545	121.97	11.29	214.04	18.42
9.45	.2025	131.77	12.01	223.87	19.45
10.53	.2637	141.71	12.74	233.54	20.58
11.72	.3394	151.71	13.47	243.06	22.26
12.98	.4308	161.77	14.21	252.62	23.41
14.37	.5363	SERIES XXIII		262.23	24.81
15.91	.6685			SERIES XXV	
17.54	.8194	142.99	12.82		
19.30	.9929	152.83	13.54	250.22	22.99
21.24	1.195	162.63	14.28	260.04	24.62
23.38	1.434	172.41	15.03	269.86	26.06
25.81	1.716	182.19	15.78	279.72	27.27
28.59	2.048	192.09	16.55	289.55	28.48
31.68	2.434			299.26	30.31
34.55	2.802			SERIES XXVI	
37.31	3.157				
40.63	3.584			307.21	32.21
44.68	4.100			317.04	34.18
49.43	4.695			326.92	36.12
54.78	5.344			336.76	37.87
60.68	6.021			346.58	38.75
				355.85	41.33
II.d. Slow Cooled at 1 K/h					
SERIES XXVII		SERIES XXVIII		SERIES XXIX	
196.16	16.85	273.98	26.49	331.81	36.78
206.05	17.69	283.87	27.98	341.68	38.26
215.95	18.56	293.74	29.57	350.47	39.66
225.81	19.61	303.60	31.21	357.08	41.70
235.62	20.78	313.40	33.11		
245.32	22.19	323.21	35.16		
255.02	23.66				
264.77	25.19				

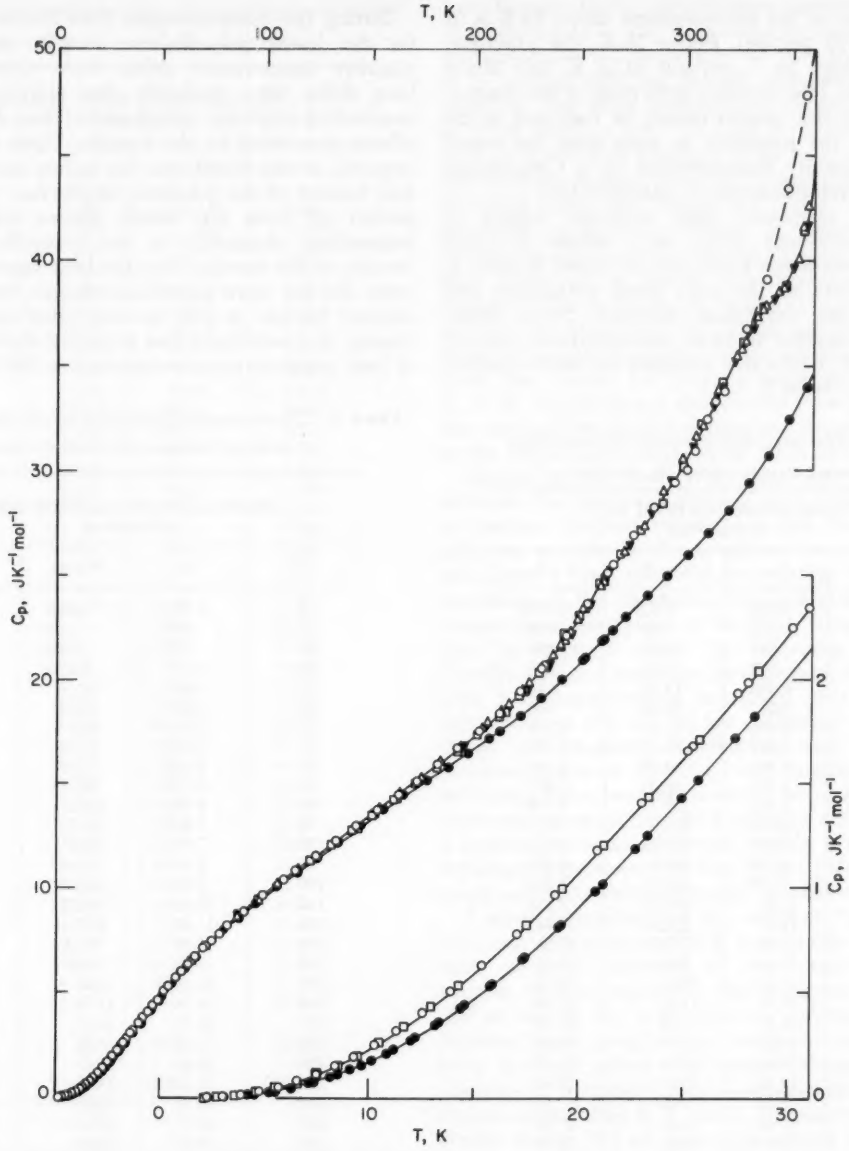

FIGURE 1. *Heat capacity of polyethylene.*

Linear, (SRM 1475 as received): ●. Branched, (SRM 1476): ○ as received, △ stabilized at 360 K and then quenched, □ annealed at 230 K, ▼ slow cooled.

501-968 O - 73 - 2

The precision of the measurement above 25 K is in the order of 0.05 percent. Below 25 K, the precision gradually changes to 1 percent at 5 K and about 5 percent at 2 K. The accuracy over most of the temperature range of the measurement is believed to be comparable to the precision as seen from the result of the heat capacity measurement on a Calorimetry Conference standard sample of sapphire [22].

Analytically smoothed heat capacity values at rounded temperatures along with values of other derived thermodynamic functions are listed in table 2. H_0 and S_0 refers to the zero point enthalpies and entropies of the individual samples. Since these samples are expected to have undetermined residual entropies at 0 K, Gibbs free energies for these samples are not given in table 2.

During the measurements from Series VIII to XIII for the linear polyethylene sample, relatively long negative temperature drifts were observed. These long drifts were probably due mainly to the slow responding adiabatic shield rather than due to thermal effects generated by the sample. Upon unloading the cryostat, it was found that the heater wires for the top and bottom of the adiabatic shield had partially been peeled off from the shield. Hence the shield was responding sluggishly to the controller. Since the density of the sample after the heat capacity measurement did not show significant change from that of the original sample, it may be concluded that little or no change in crystallinity had occurred during the course of heat capacity measurement up to 360 K.

TABLE 2. *Thermodynamic functions of polyethylene*

(units in J, K and base mole [$-CH_2-$]=14.027)

Linear polyethylene (SRM 1475) As Received			
T	C_p	$H-H_0$	$S-S_0$
5	0.024	0.029	0.0076
10	.173	.46	.062
15	.473	2.01	.184
20	.904	5.41	.376
25	1.433	11.22	.633
30	2.027	19.85	.946
35	2.664	31.57	1.306
40	3.322	46.53	1.705
45	3.981	64.79	2.134
50	4.626	86.31	2.587
60	5.841	138.7	3.540
70	6.935	202.7	4.524
80	7.911	277.1	5.515
90	8.786	360.6	6.498
100	9.579	452.5	7.465
110	10.31	552.0	8.413
120	11.01	658.6	9.341
130	11.70	772.2	10.25
140	12.44	892.8	11.14
150	13.18	1021	12.03
160	13.91	1156	12.90
170	14.61	1299	13.77
180	15.30	1449	14.62
190	15.98	1605	15.47
200	16.66	1768	16.30
210	17.36	1938	17.13
220	18.10	2116	17.96
230	18.91	2301	18.78
240	19.80	2494	19.60
250	20.76	2697	20.43
260	21.76	2909	21.26
270	22.78	3132	22.10
280	23.80	3365	22.95
290	24.83	3608	23.80
300	25.87	3862	24.66
310	26.95	4126	25.53
320	28.11	4401	26.40
330	29.39	4688	27.29
340	30.86	4989	28.19
350	32.59	5306	29.10
360	34.65	5642	30.05
273.15	23.10	3204	22.37
298.15	25.68	3814	24.50

TABLE 2. *Thermodynamic functions of polyethylene*—Continued

(units in J, K and base mole [$-CH_2-$]=14.027)

Branched Polyethylene (SRM 1476) As Received			
T	C_p	$H-H_0$	$S-S_0$
5	0.036	0.043	0.011
10	.238	.651	.088
15	.599	2.686	.248
20	1.077	6.835	.483
25	1.631	13.58	.782
30	2.233	23.22	1.132
35	2.871	35.97	1.524
40	3.511	51.93	1.949
45	4.151	71.09	2.400
50	4.773	93.40	2.869
60	5.945	147.1	3.845
70	7.008	211.9	4.842
80	7.971	286.9	5.842
90	8.849	371.1	6.832
100	9.662	463.7	7.807
110	10.43	564.2	8.764
120	11.16	672.1	9.703
130	11.89	787.4	10.63
140	12.63	910.0	11.53
150	13.38	1040	12.43
160	14.14	1178	13.32
170	14.91	1323	14.20
180	15.69	1476	15.07
190	16.49	1637	15.94
200	17.32	1806	16.81
210	18.22	1983	17.68
220	19.21	2170	18.55
230	20.32	2368	19.42
240	21.66	2577	20.32
250	23.14	2801	21.23
260	24.63	3040	22.17
270	26.08	3294	23.12
280	27.51	3562	24.10
290	28.96	3844	25.09
300	30.50	4141	26.09
310	32.23	4455	27.12
320	34.31	4787	28.18
330	36.92	5143	29.27
340	40.27	5528	30.42
350	44.62	5952	31.65
360	50.25	6425	32.98
273.15	26.53	3377	23.48
298.15	30.20	4085	25.91

TABLE 2. *Thermodynamic functions of polyethylene*—Continued

(units in J, K and base mole [—CH_2—] = 14.027)

Branched Polyethylene (SRM 1476)
Annealed

T	C_p	$H-H_0$	$S-S_0$
5	0.035	0.043	0.011
10	.233	.637	.086
15	.590	2.637	.244
20	1.065	6.732	.476
25	1.620	13.42	.772
30	2.223	23.01	1.120
35	2.859	35.71	1.510
40	3.503	51.61	1.934
45	4.142	70.73	2.384
50	4.766	93.01	2.853
60	5.943	146.6	3.827
70	7.012	211.5	4.825
80	7.974	286.5	5.825
90	8.846	370.7	6.816
100	9.652	463.2	7.790
110	10.41	563.6	8.746
120	11.15	671.4	9.684
130	11.88	786.6	10.61
140	12.60	909.0	11.51
150	13.34	1039	12.41
160	14.09	1176	13.29
170	14.84	1320	14.17
180	15.60	1473	15.04
190	16.38	1632	15.90
200	17.19	1800	16.76
210	18.06	1976	17.62
220	19.03	2162	18.48
230	20.13	2357	19.35
240	21.27	2564	20.23
250	22.90	2785	21.13
260	24.50	3022	22.05
270	25.92	3274	23.00
280	27.30	3541	23.96
290	28.84	3821	24.95
300	30.60	4119	25.95
310	32.59	4434	26.98
320	34.55	4770	28.04
330	36.33	5125	29.14
340	37.95	5497	30.24
350	39.74	5883	31.37
360	42.82	6295	32.52
273.15	26.35	3359	23.28
298.15	30.26	4064	25.74

The low temperature heat capacity of the linear polyethylene sample, SRM 1475 as received, agrees within 1 percent of that reported for Marlex 2,[2] one of the two linear polyethylene samples studied by Tucker and Reese [17]. This agreement may be expected, since the densities and hence the crystallinities of these two samples are very close to each other. The densities at room temperatures are 0.954 and 0.958 g cm^{-3} for SRM 1475 as received and Marlex 2, respectively. Below 30 K the heat capacity behavior of the branched polyethylene sample, SRM 1476, is similar to that of the Low Density (L.D.) polyethylene sample also reported in reference [17]. The heat capacity of SRM 1476 is in general about 1–2 percent lower than that of L.D. This is in accord with the density differences of the two samples. The room temperature density of SRM 1476 at 0.925–0.927 g cm^{-3} is slightly higher than that of L.D. at 0.915. The lowering of the heat capacity due to the increase in density or due to annealing can also be detected when the results for SRM 1476 in the as received condition ($\rho = 0.925$) is compared with that in the annealed condition ($\rho = 0.927$). From 20 to 360 K, heat capacities of linear polyethylene samples from several previous works [3, 9, 21, 31] are within 5 percent of the values for the linear polyethylene sample reported here, irrespective of their origins and densities. Even the values for various branched polyethylene [3, 9, 14, 15, 31] do not differ more than 5 percent from the value of the linear polyethylene sample of this work in the temperature range from 40 to 230 K.

Figures 2a and 2b show the heat capacity differences between the branched polyethylene sample subjected to various thermal treatments and the linear polyethylene sample in the condition as received. These two figures also show approximately the degree of precision of the measurements reported here. A low temperature maximum in the heat capacity difference may be seen in figure 2a centering around 30 K. Similar features may also be observed if low temperature heat capacities of branched polyethylene from other sources [14, 17, 31] are compared against that of linear polyethylene. Maxima in heat capacity differences between the glass and crystal of the same substance have been observed to occur in the temperature range around 15 to 40 K in many substances. Such a feature has been attributed mainly to the volumetric differences between the two forms [32] and has also been correlated with Schottky functions [31].

A small irregularity in the order of 1 percent of the heat capacity at about 140 K is probably caused by the heat capacity behavior of the linear polyethylene sample in that region. In the temperature region of 230 to 260 K the heat capacity difference seems to increase more steeply than that in the regions immediately above or below. The abrupt increase in the heat capacity of branched polyethylene in the temperature region around 240 K is more pronounced in a calorimetric study [31] on a sample having lower density, 0.91 g cm^{-3}, than that of SRM 1476, and in thin film calorimetric results [6] on an even lower density, 0.89 g cm^{-3}, sample. The magnitude of this heat capacity irregularity, characteristic of a glass transition, increases as the density of the sample is decreased or as the amorphous content of the sample is increased. Hence the glass transition temperature of branched polyethylene is located around 235 to 240 K.

Below 250 K the heat capacity of the annealed or slow-cooled branched polyethylene samples is lower than that of the as received or the quenched sample. Above 250 K, however, the apparent heat capacity which may include any crystallization or premelting processes seems to be partially a function of where

[2] Certain commercial materials are identified in this paper in order to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Bureau of Standards.

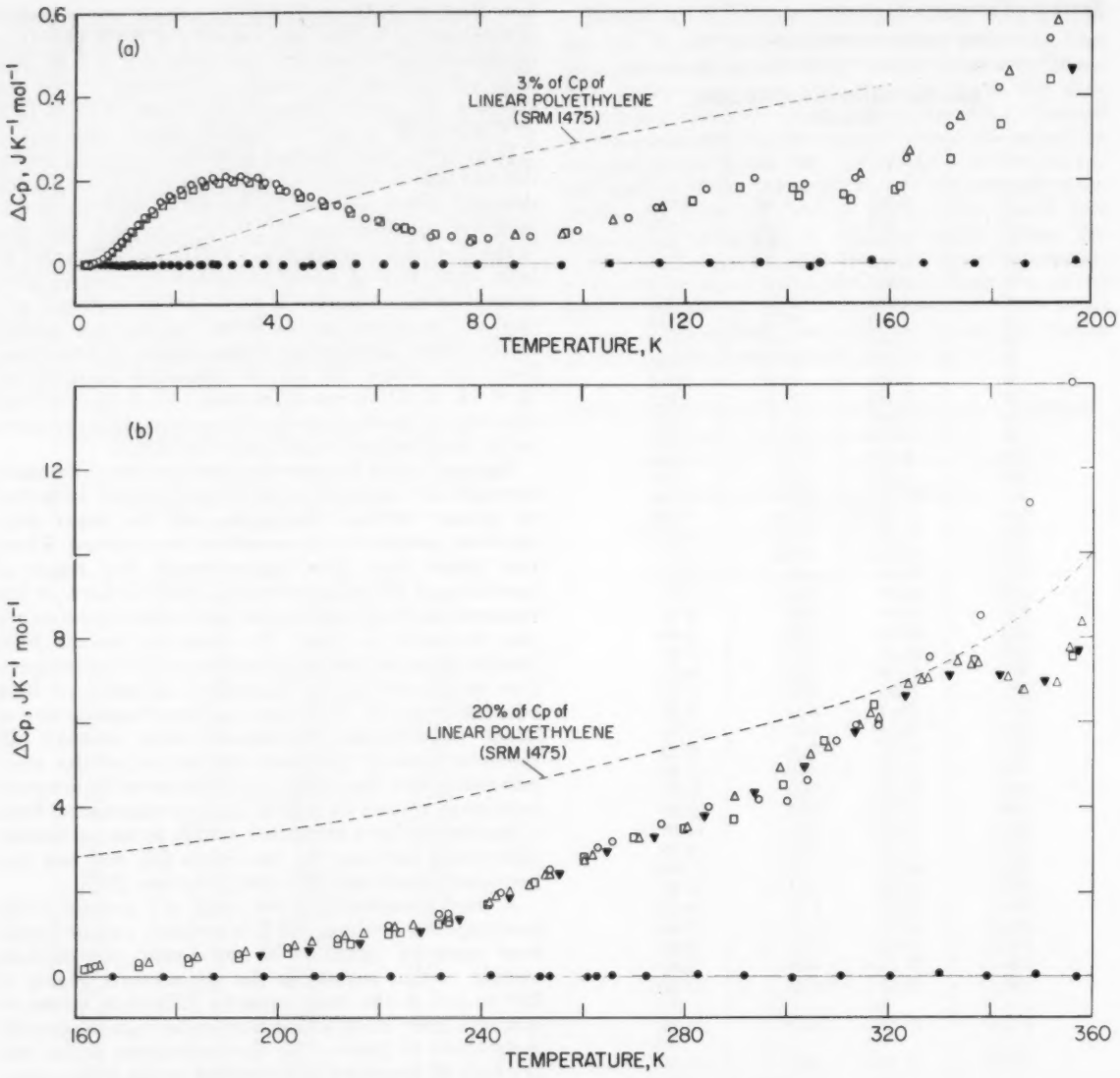

FIGURE 2. *Comparison of heat capacity of polyethylene.*

Baseline: smoothed values for linear polyethylene, SRM 1475 as received. All legends same as in figure 1. (a) Below 200 K. (b) Above 160 K.

the sample had been held previously at some higher temperature. When the sample is stored at temperatures above 250 K, the heat capacity is usually lowered in the vicinity of the storage temperature.

In order to assess the effect of the thermal history on the heat capacity of branched polyethylene and on the spontaneous temperature drift behavior (fig. 3) the following procedure was carried out. During the loading of the sample, a water-cooled jacket was used to surround the sample container, so that the sample would not be heated above room temperature during the process of soldering the container top. The sample was cooled in the cryostat by radiation and conduction at a rate of about 5 K h^{-1}. The heat capacity of the as-received sample was measured below room temperature before the sample was heated above room temperature. No large spontaneous temperature drift was observed until the sample was heated above 330 K. Positive temperature drifts as high as 0.1 K min^{-1} were observed in the region 350 to 360 K, indicating that additional crystallization may have taken place. Figure 3 shows the spontaneous temperature drifts observed at about 30 min after the termination of the electrical energy input to the calorimeter. The sample

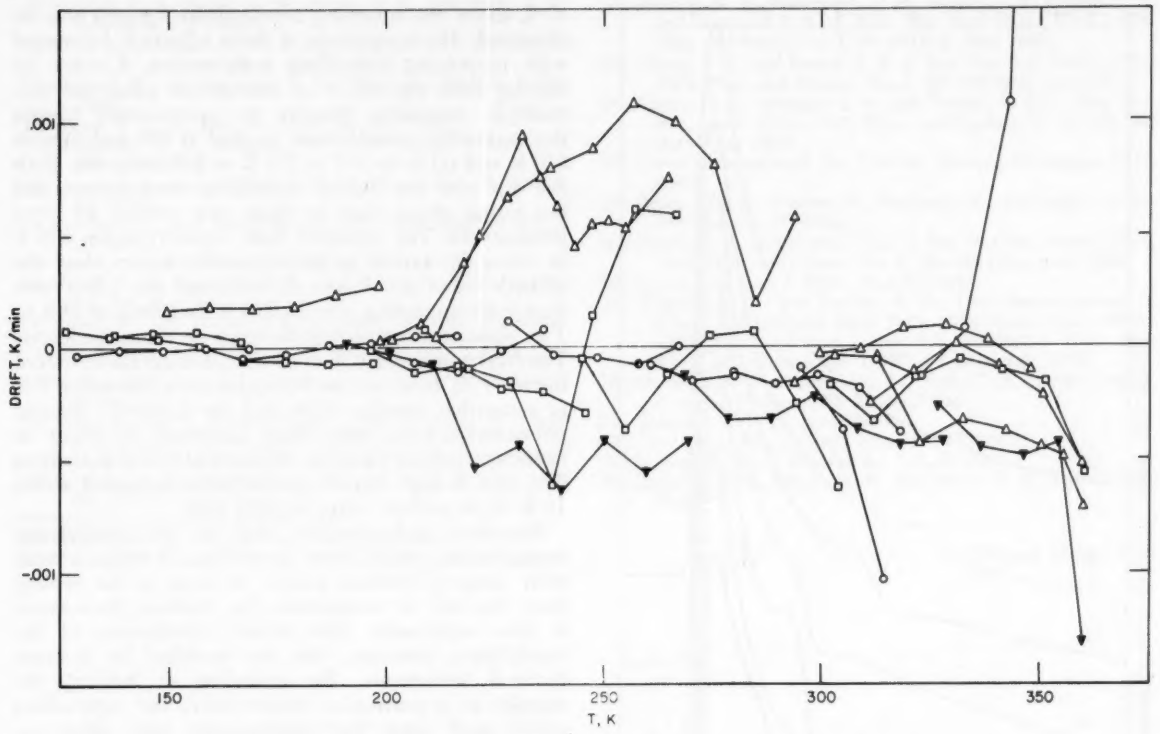

FIGURE 3. *Spontaneous calorimetric temperature drift in branched polyethylene.*

Data within a series are linked by straight lines. All legends same as in figure 1.

was then "stabilized" by maintaining the sample temperature at 360 K for 5 days. The sample was then quenched to temperatures below 100 K at a rate of about 5 K min^{-1}. Upon heating, a spontaneous warming trend starting around 210 K and reaching a peak around 230 K was observed. However large warming drifts persisted to about 300 K. The sample was again quenched from high temperature and then "annealled" at 230 K for 4 days. During the course of heat capacity measurement on the annealed sample, a spontaneous cooling peak was observed around 240 K. Upon further heating a large warming drift again showed up. Finally, heat capacity measurements were performed on the sample after it had been "slowly cooled" from 360 to 200 K at a rate of about 1 K h^{-1}. A rather broad region of spontaneous cooling drifts with a peak around 240 K was observed.

The first large warming drift peaks at about 230 K and the first cooling peaks at about 240 K due to quenching and annealing (or slow cooling), respectively, are probably associated with the glass transition phenomena. The large warming drifts seen above 250 K in both quenched samples and quenched samples followed by annealing are however due to crystallization of the polymer above the glass transition temperature.

A commercial differential scanning calorimeter (DSC) was also used to demonstrate qualitatively the behavior of the branched polyethylene sample. A sample of SRM 1476 weighing approximately 10 mg was subjected to various thermal treatments in the DSC and was then observed under identical operational conditions, such as the scanning rate, slope adjustment, temperature calibration adjustments, etc. The recorded traces of the DSC observations are reproduced in figure 4. Each trace was shifted vertically by a certain amount except trace (g) which was shifted a little more than the others. The vertical axis denotes the difference in the power inputs to the sample and to the reference, and hence is related to the difference in the heat capacity between the sample and the reference. The values on the abscissa are the readings of the temperature indicator of the DSC. The annealing temperatures for various traces were also read directly from the indicator. Neither the indicated programming temperature during a scan nor the isothermal temperature during annealing were corrected to the sample temperature. Under the operational conditions of the present observations, these corrections were less than 3 K.

All the curves are obtained with a scanning speed of 10 K min^{-1} from 310 to 420 K after the sample has

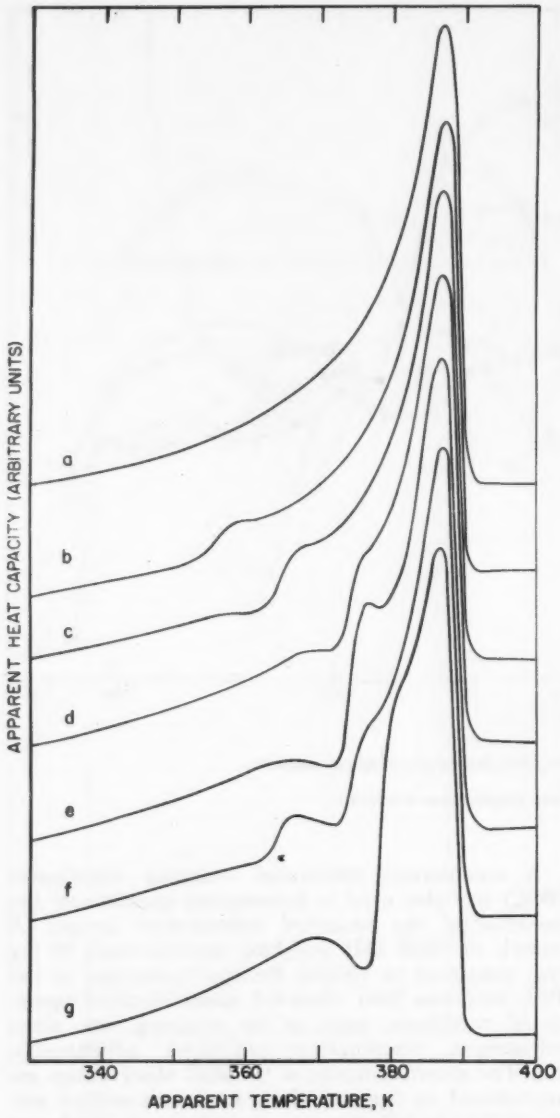

FIGURE 4. *DSC melting curves of branched polyethylene.*

All curves obtained with a scanning rate of 10 K min^{-1} after various thermal treatments: (a) cooled at -2.5 K min^{-1}. All other curves, cooled rapidly from the melt and then held at: (b) 350 K, (c) 360 K, (d) 370 K, (e) 360 and then at 370 K, (f) 370 and then at 360 K, (g) 350 and then at 5 K intervals to 375 K.

been cooled from the melt and received various thermal treatments. Curve (a) is a smooth trace obtained after cooling the sample continuously at a rate of 2.5 K min^{-1} from the melt. Curves (b), (c), and (d) show the effect of annealing or holding the sample in the DSC for 15 min at 350, 360, and 370 K, respectively. Annealing lowers the apparent heat capacity, including any premelting and recrystallization phenomena, near the annealing temperature. At 5 to 10 K above the annealing temperature a hump may be observed. The magnitude of these effects is increased with increasing annealing temperature. Curves (e) and (g) show the effect on the sample subjected to a multiple annealing process by successively raising the annealing temperature: (e) first at 360 and then at 370 K and (g) from 350 to 375 K at 5 K intervals. Both the dip near the highest annealing temperature, and the hump above that in these two curves are very pronounced. The apparent heat capacity below 370 K in curve (g) seems to be noticeably higher than the smooth curve (a). Curve (f) indicates the effect produced by annealing first at 370 K and then at 360 K. Two dips and humps may be seen on the same curve. The hump above 370 K is similar in magnitude to that in curve (d), however the hump between 360 and 370 K is somewhat smaller than that in curve (c). Similar phenomena have also been observed to occur in branched polyethylene by differential thermal analysis [33], and in high density polyethylene annealed within 15 K of its melting point by DSC [34].

Branched polyethylene, due to its geometrical irregularities, may form crystallites having a very wide range of melting points. As long as the cooling from the melt is continuous, the melting phenomena is also continuous. The smooth distribution of the crystallites, however, may be modified by discrete thermal treatments. By annealing or holding the sample at a particular temperature, the crystallites which melt near that temperature may either recrystallize or grow into less defective or larger crystallites. Thus the annealing process may deplete part of crystallites that melt near the annealing temperature and increase the amount of crystallites that melt at higher temperatures. Crystallites melting at much lower temperatures may not be affected by this process as they may not be incorporated into the high melting crystallites and may be formed again upon subsequent cooling. Therefore, in the DSC traces for the annealed samples, the apparent background heat capacity below the annealing temperature is similar to that of a smooth distribution. By correlating the more sensitive plot of heat capacity difference in figure 2b with the plot of observed calorimetric temperature drift in figure 3, one finds that the dips in the heat capacity curves at 290, 300, and 350 K are not associated with any large positive drifts. Therefore the dip in heat capacity curve near the annealing temperature is probably due to a depletion of crystallites which melt in that region.

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The Quasi-Harmonic Approximation and a Generalized Grüneisen Equation of State

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The validity of the Grüneisen equation of state for a solid having a continuous distribution of frequencies is investigated. It is shown that one cannot generally replace $\partial S/\partial V$ with the heat capacity multiplied by appropriate Grüneisen constants. A model frequency distribution is used to show the difference that can arise.

Key words: Crystal equation of state; frequency distribution; Grüneisen constant; Grüneisen equation of state; quasi-harmonic approximation; thermal expansion.

1. Introduction

The Grüneisen equation of state has been widely used to discuss the thermal properties of solids. While it is reasonably successful with simple monatomic solids, it has been found to be less adequate with polyatomic solids and the need to expand its definition has been well established.

The principal idea in the modification of the simple Grüneisen equation has been the recognition that the frequency spectrum of a solid is not characterized by just a single frequency. Rather, many frequencies are involved and not all of them shift with volume in the same way. Thus, Blackman [1, 2][1] replaces the simple Grüneisen equation

$$\alpha = \gamma C_v / B_T V \tag{1}$$

with

$$\alpha = \sum_i \gamma_i C_{vi} / B_T V \tag{2}$$

where the Grüneisen constant is defined as $\gamma_i = -d \ln \nu_i / d \ln V$, $B_T = -V\left[\frac{\partial p}{\partial V}\right]_T$, C_{vi} is the specific heat for frequency ν_i, P is the pressure and V is the molar volume. Blackman does go further and allows the summation to become an integral where now

$$\alpha = \int \gamma(\nu) C_v(\nu) \rho(\nu) d\nu / B_T V \tag{3}$$

where $\rho(\nu)$ is the spectral density for frequency ν. However, eq (2) directly implies only an integral over the index i (or the wave vector q) and it should be asked as to whether eq (3) is a proper integral. If the index is one-dimensional and if there is a unique value of ν associated with every value of the index, then the transformation will go through to eq (3). If the index is an n dimensional wave vector, then there will be an $n-1$ dimensional surface of constant ν and only if for all the points on the surface is γ a constant, will eq (3) result. Obvious cases where this will hold, such as having only one force constant or having all the force constants have the same logarithmic derivative actually lead to eq (1) rather than (3) since γ is a constant for all ν. If ν involves sums of force constants multiplied by functions of the wave vector, and if each force constant has a different logarithmic derivative then the conditions for (3) are clearly not satisfied and the question of a proper replacement for (3) arises.

In the course of previous work [3, 4] on soft crystals, it became apparent that eq (1) was quite inadequate to reproduce the thermal expansion and yet it was felt that the quasi-harmonic approximation inherent in the Grüneisen equation still might be adequate. This consideration has led to the extension of simple Grüneisen theory described below that in proper limits reduces to eqs (1) and (2) and yet is more widely applicable.

2. Theory

The derivation of the main equation is straightforward and is within the scope of general quasi-harmonic theory. In the following equations we will consider a solid with n dispersion curves characterizing its frequency spectrum with no attempt to distinguish between acoustic or optical branch values unless indicated. Furthermore, only one branch will

[1] Figures in brackets indicate the literature references at the end of this paper.

be considered at a time since the general result will be a simple summation over like terms for each branch.

From thermodynamics,

$$\alpha B_T = \frac{\partial^2 A}{\partial T \partial V}. \tag{4}$$

Using quasi-harmonic lattice dynamics, one may write the Helmholtz free energy as

$$A = \int_{\nu_1}^{\nu_2} F(\nu)\rho(\nu)\, d\nu \tag{5}$$

where $F(\nu)$ is the Einstein free energy function [5] for frequency ν and $\rho(\nu)$ is the frequency density function. In order to ensure that all functions are properly single valued and smooth, the integral may be restricted to the frequency interval $[\nu_1, \nu_2]$ and to only one branch of the frequency spectrum. When this is done A will simply be the sum of integrals like that of eq (5).

Using the quasi-harmonic approximation, $\rho(\nu)$ is a function of volume only and so are ν_1 and ν_2 while $F(\nu)$ is a function of temperature but not volume. Therefore,

$$\alpha B_T = -\frac{\partial}{\partial V}\int_{\nu_1}^{\nu_2} S(\nu)\,\rho(\nu)\, d\nu \tag{6}$$

where $S(\nu)$ is the Einstein entropy function and the indicated temperature differentiation has been carried out.

The main point of this paper is the interesting observation that eq (6) is as far as one can go and keep the full generality of the quasi-harmonic approximation. It should be noted that no further assumptions have been added and the mathematics has been quite rigorous.

The question arises as to how a Grüneisen equation can be derived from eq (6). The answer is that if A is a function of θ/T and θ which is equal to $h\nu/k$ is volume dependent only, then one can reduce eq (6) to eq (1) as has been shown by Kittel [6]. This assumption also validates eq (2) since a summation of terms in θ_i/T also can be carried out. Unfortunately, eq (3) cannot be so obtained. This can be seen by applying the Leibnitz rule for the differentiation of a definite integral to eq (6) to obtain

$$\alpha B_T = -\int_{\nu_1}^{\nu_2} S(\nu)\frac{\partial \rho(\nu)}{\partial V}\, d\nu$$

$$-S(\nu_2)\,\rho(\nu_2)\frac{\partial \nu_2}{\partial V} + S(\nu_1)\,\rho(\nu_1)\frac{\partial \nu_1}{\partial V} \tag{7}$$

Equation (7) is now seen not only to have a different integral but to include two extra terms that cannot be related in any manner to eq (3) since they involve entropy terms that will not reduce to heat capacity terms or will not cancel in general. Therefore, it is eq (7) and not eq (3) that is the proper expression to use for a continuous distribution of frequencies.

A Grüneisen type analysis can be obtained if $\rho(\nu)$ is $\rho(\nu; \nu_1, \nu_2, \ldots \nu_m)$ where ρ is a function of volume only through the parameters ν_i, which are expressed as frequencies. Then eq (7) can be written

$$\alpha B_T V = \sum_i \gamma_i \nu_i \int_{\nu_1}^{\nu_2} S(\nu)\frac{\partial \rho\ (\nu)}{\partial\ \nu_i}\, d\nu$$

$$+\gamma_2\,\nu_2\,S(\nu_2)\rho(\nu_2) - \gamma_1\,\nu_1\,S(\nu_1)\,\rho(\nu_1). \tag{8}$$

Note that unlike eq (3) there is no $\gamma(\nu)$ appearing in (8). This is a result of the use of a definite integral; the variable ν is a variable of integration and merely serves to define a function of the other variables. Therefore, it is not available for formation of a Grüneisen parameter and there is no rigorous physical way to define any $\gamma(\nu)$ when using only a $\rho(\nu)$. It is only when the frequency spectrum changes with volume with respect to a finite number of critical frequencies that a Grüneisen parameter analysis can be used and then only in the form of eq (8). Again it should be noted that in the special case that a Debye or Einstein distribution is used, eq (8) will reduce to eq (1).

3. Application

While eqs (7) and (8) look more forbidding than the usual extensions to Grüneisen theory its application can be straightforward since, if the entropy as a function of state is known, only differentiations are required. This is illustrated quite well by the previous work on linear carbon chains [3, 4].

In that work an approximation scheme was used to generate the frequency spectrum of a finite linear chain. Each branch of the spectrum was assumed to be such that the frequency density was proportional to the frequency between the free chain frequency and a higher frequency that was the root of the sum of the squares of the free chain frequency and the highest lattice frequency corresponding to the entire chain moving as a unit. Only the latter frequency was allowed to vary with volume as only it depended on interchain force constants. This is in analogy with a linear diatomic chain of equal masses and alternating force constants, where for small changes in the weaker force constant there is little change in shape of the dispersion curves and the limits on the frequencies correspond to the assumptions made for the finite chains.

This model allowed an easy application of the method of this paper with rather good success. For this model

$$\rho(\nu) = \frac{2\nu}{\nu_2^2 - \nu_1^2}, \qquad \nu_2 \geq \nu \geq \nu_1. \tag{9}$$

TABLE 1

$kT/h\nu_2$ \ ν_1/ν_2	.1		.5		.9	
	$\frac{1}{\gamma R}\frac{\partial S}{\partial V}$	C_v/R	$\frac{1}{\gamma R}\frac{\partial S}{\partial V}$	C_v/R	$\frac{1}{\gamma R}\frac{\partial S}{\partial V}$	C_v/R
0.05	0.0187	0.02781	0.0001	0.0004	0.0000	0.0000
.1	.1149	.1348	.0189	.0410	.0032	.0069
.2	.4142	.4437	.2108	.3371	.1014	.1987
.4	.7486	.7831	.5077	.7343	.3362	.6373
.6	.8573	.8931	.6125	.8683	.4330	.8145
.8	.9013	.9375	.6557	.9229	.4745	.8901
1.0	.9228	.9593	.6770	.9497	.4953	.9279
10.0	.9627	.9996	.7168	.9995	.5347	.9992

In applying eq (8) to (9), ν_1 was assumed to be independent of frequency so that

$$\alpha\frac{B_T V}{R\gamma_2}=\frac{\nu_2}{[1-(\nu_1/\nu_2)^2]^2}\left\{3\left[D(\nu_2)-\left(\frac{\nu_1}{\nu_2}\right)^2 D(\nu_1)\right]\right.$$

$$\left.-2\left(\frac{\nu_1}{\nu_2}\right)^2[F(\nu_2)-F(\nu_1)]-2\left[1-\left(\frac{\nu_1}{\nu_2}\right)^2\right]E(\nu_2)\right\} \tag{10}$$

where $D(\nu)$, $E(\nu)$ and $F(\nu)$ are the two dimensional Debye function, the Einstein internal energy function and the Einstein free energy function respectively and where R is the gas constant. If ν_1 approaches zero, eq (10) is seen to become the ordinary Grüneisen relation with the heat capacity being that for a two-dimensional Debye solid. However, as ν_1 becomes greater than zero, departures will occur. This is illustrated in table 1 where both the heat capacity and $\partial S/\gamma\partial V$ are compared for a few different frequency intervals. Note the different assymptotic limits for the two functions.

4. Conclusion

From the above considerations, it can be seen that the extension of the quasi-harmonic approximation and Grüneisen analysis to complex solids is not as simple as has been generally postulated. One must introduce Grüneisen parameters with care and they can be defined only on the more restrictive condition that the frequency spectrum is defined, as a function of volume, by a discrete number of critical frequencies. Even for this case one cannot use a simple Grüneisen eq (1) but must replace the heat capacity term by a proper derivative of the entropy function as in eq (8).

If this is done, however, it is then possible to write explicit forms for the equation of state that introduce no further assumptions into the model.

This is a great benefit in investigating model calculations. Also, it can be seen that empirical checks of quasi-harmonic approximation in terms of thermal expansion are more involved than generally realized since the quantity $(\partial S/\partial V)_T$ is not one that is readily available experimentally and yet is the quantity that must be used.

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Valence Resonance States of N_2^-*

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Resonance valence excited states of N_2^- are calculated and used to interpret resonant excitation of the A and B states of N_2 by electron impact.

Key words: Electron scattering resonance; excited states N_2; excited states N^-; inelastic scatter; N_2^-; valence excited states.

Sanche and Schulz [1][1] have observed structure in transmission of electrons between 9 and 11 eV in collision with N_2. They attributed the origin of this structure to the excitation of an unknown state or to resonance phenomena involving attachment of the scattered electron to an excited valence state. The latter interpretation has been supported by recent studies by Mazeau et al. [2], on the resonant excitation of the A $^3\Sigma_u^+$ and $B^3\Pi_g$ states of N_2.

This note reports calculations of valence negative ions states that will support a valence resonance state mechanism for the observations. The dominant molecular orbital configurations of the A $^3\Sigma_u^+$ and $B^3\Pi_g$ states are, respectively:

$$1\sigma_g^2 1\sigma_u^2 2\sigma_g^2 2\sigma_u^2 3\sigma_g^2 1\pi_u^3 1\pi_g, \qquad A\ ^3\Sigma_u^+$$

and

$$1\sigma_g^2 1\sigma_u^2 2\sigma_g^2 2\sigma_u^2 1\pi_u^4 3\sigma_g^1 \pi_g, \qquad B^3\Pi_g.$$

Within the $V = 0$ turning points of X $^1\Sigma_g^+$ there is only one valence excited molecular orbital determined by calculation, the $1\pi_g$. Rydberg attachments are calculated to yield higher energy states and can not be considered within the bound state formalism used in this study; variationally the diffuse electron wave function is found to be a constant and represent a zero-energy continuum electron. But the valence electron is found to be stabilized and an approximation to the resonance state is found by adding a $1\pi_g$ electron to the A $^3\Sigma_u^+$ and $B^3\Pi_g$ parent configurations to yield (ignoring the core electrons):

$$3\sigma_g^2 1\pi_u^3 1\pi_g^2, \qquad {}^4\Pi_u, {}^2\Phi_u, {}^2\Pi_u(3)$$

and

$$1\pi_u^4 3\sigma_g 1\pi_g^2, \qquad {}^4\Sigma_g^-, {}^2\Delta_g, {}^2\Sigma_g^-, {}^2\Sigma_g^+$$

Three of the lowest energy states were chosen, $^4\Pi_u$, $^2\Phi_u$, and $^4\Sigma_g^-$ and the energy calculated with an all-valence multi-configuration self-consistent-field (MC–SCF) trial function [3]. This procedure was used previously for a study of O_2^- excited states where details may be found [4]. Diffuse trial functions were included for the representation of the $1\pi_g$ function but were not found to dominate the orbital at any distance. This choice of trial wave function restricts the orbitals to be essentially valence in character with, however, the diffuse tail found in atomic negative ions. Since the $N^-(^3P)$ state is not bound the ion asymptotic energies are calculated above the $N(^4S) + N(^4S)$ asymptote. Specific correlation functions are known to correct this error [5] but were not considered since a qualitative survey was felt to be sufficient at this time.

The energy curves are given in figure 1 with the asymptotes shifted to agree with the experimental values. The binding of $N^-(^1D)$ relative to $N(^2D)$ was calculated at the all-valence MC–SCF level without correlation. The $^4\Pi_u$ energy curve has an energy minimum near 1.5 Å (the exact value can not be determined from the relatively few calculated points) and a dissociation energy about 3.2 eV in this approximation. The T_e relative to X $^1\Sigma_g^+$ is then about 6.8 eV. The $^2\Phi_u$ state has a similarly shaped energy curve that goes asymptotically to $N^-(^3P) + N(^2D)$. It would have a T_e of about 8.5 eV.

The $^4\Sigma_g^-$ curve equilibrium internuclear separation is at somewhat shorter distances than that of the $^4\Pi_u$ state. Estimating the T_e is complicated by the uncertainty in the $N^-(^1D) + N(^4S)$ asymptote. Using the calculated asymptotic energy, the $^4\Sigma_g^-$ T_e is about 8.8 eV.

The $^4\Pi_u$ state is hypothesized to support the A state resonances reported by Mazeau et al. [2], while the

*This work supported in part by NASA.

[1] Figures in brackets indicate the literature references at the end of this paper.

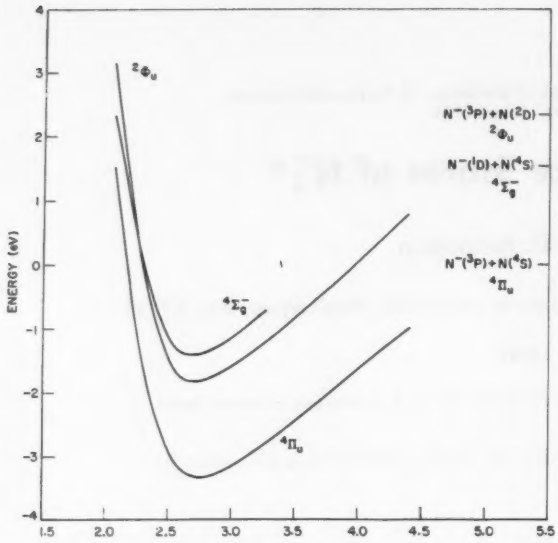

FIGURE 1. *Multiconfiguration electronic energy curves of N_2^-.*

The energy ordinate is given in eV and the internuclear distance on the abscissa is given in atomic units where 1 a.u. equals 0.529177Å.

$^4\Sigma_g^-$ state supports their B state resonances. This agrees with the assumption of Mazeau et al. that these are core excited shape resonances in which the A state parent resonance decays into the A state and similarly for the B state parent resonance. However, these calculations suggest, as observed before [1], that the excited molecular orbital supporting a shape resonance is a valence-type orbital which is the $1\pi_g$ in this case. It is also found that these resonance states are not bound in the Franck-Condon region relative to the parent excited state as noted earlier for valence resonance states [6].

The decay mechanism for these states must be somewhat complicated. This is because both resonance states are quartets which can not be excited from the X $^1\Sigma_g^+$ state without involving a spin-orbit coupling of some kind. The doublet states that can arise are calculated too high in energy to fit the observed excitation energies.

However, $^4\Pi_u - ^2\Pi_u$ spin-orbit mixing provides a means of coupling the ground with the resonance state. The characteristic of the $^2\Pi_u$ state with respect to its auto-detachment width and the depth of its energy curve is not known and renders further analysis difficult.

The mixing of the $^4\Sigma_g^- - ^2\Sigma_g^-$ states is of no concern since the $^2\Sigma_g^-$ state is not reached by electron scattering from the ground state. It is, however, possible to mix the $^4\Sigma_g^-$ and $^2\Sigma_g^+$ states, as well as the low energy $^2\Pi_g$ shape resonance by spin-orbit interaction.

Since the equilibrium internuclear separations of both the $^4\Pi_u$ and $^4\Sigma_g^-$ states are significantly shifted with respect to the neutral ground state, a large number of vibrational levels are expected to be excited. The $^4\Pi_u$ resonances would be apparent only to the dissociation limit of 9.6 eV. In the case of the $^4\Sigma_g^-$ resonance the dissociation limit is $N^-(^1D) + N(^4S)$ which is calculated to be about 1.5 eV above the $N^-(^3P) + N(^4S)$ asymptote. The B resonances are apparent only to 11.15 eV [2] which is remarkably close to the calculated $^4\Sigma_g^-$ dissociation limit. Although the comparison of calculated and observed resonance energies are in reasonable agreement, it should be noted that a fairly complex angular behavior of the scattered electron has been observed and interpreted as due to several resonances [2]. Bound state calculations such as these reported here, however, are mute with regard to the direct scattering process. One should only conclude that the $^4\Pi_u$ and $^4\Sigma_g^-$ states are an important part of the resonant scattering and would have to be included in any more complete treatment.

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Internal Electric Fields Near Isolated Defects in Ionic Crystals

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Integral representations for three distributions of internal electric fields near isolated defects in ionic crystals are given. These three distributions are the Gaussian distribution for electric fields associated with phonons, and two Holtsmark type distributions for electric fields associated with charged impurities when the Jahn-Teller effect is small and when it is large. Numerical values for the distributions and for the averages of squared-dipole matrix elements over them are tabulated in the conclusion.

Key words: Electric fields; F centers; Gaussian function; Holtsmark function; isolated defects.

1. Introduction

The author and A. M. Stoneham [1][1] examined recently the effects of internal electric fields produced by lattice vibrations and charged impurities on the lifetimes of low-lying relaxed states of isolated defects. We computed in [1] by statistical methods the distributions of internal electric fields produced by phonons and charged impurities. These distributions are the Gaussian distribution for the phonons, a Holtsmark distribution for charged impurities when the Jahn-Teller effect is small, and a distribution related to the Holtsmark distribution when the Jahn-Teller effect is large. We then averaged the square of dipole-radiation matrix elements over these three distributions of internal electric fields. We did not present in [1] the numerical methods by which we evaluated the distributions of fields and the averages of squared-dipole matrix elements over the distributions to avoid distracting the reader from the major physical concepts.

Some researchers have expressed an interest in the derivations of the expansions appearing in the appendix to [1] and in the numerical methods used to evaluate the averaged matrix elements. The author now takes this opportunity to present the derivations and numerical methods used in [1]. Such mathematical procedures have applications to future studies on the temperature dependence of internal electric fields near defects.

Section 2 contains integral representations for the distributions of internal electric fields and series expansions of the distributions which are valid for large and small values of the fields. Evaluations of the square of dipole-radiation matrix elements averaged over these distributions appear in section 3. Finally, section 4 contains tables which give some representative numerical values for the distributions and the averages of squared-dipole matrix elements.

2. Distributions of Fields

The authors of [1] describe three classes of internal electric fields. The first class arises from the lattice vibrations. The second and third classes arise from the static fields associated with a random distribution of charged impurities in the host lattice. Some examples of such charged impurities are substitutional aliovalent ions, vacancies, and interstitials.

2.1. Lattice Vibrations

Bennett and Stoneham [1] compute the probability that the internal electric field associated with optical phonons has a value between E and $E+dE$. They find that the probability for a harmonic lattice is proportional to the Gaussian distribution

$$G(\gamma)=\pi^{-1/2}\exp(-\gamma^2/4), \tag{1}$$

where $\gamma=(2E_2)^{-1/2}\,E$ is dimensionless and where $G(\gamma)$ is normalized to unity, $\int_0^\infty G(\gamma)\,d\gamma=1$. The quantity E_2 is the square of a characteristic electric field for the lattice. The Gaussian function $G(\gamma)$ also has the following integral representations;

$$G(\gamma)=\frac{2}{\pi\gamma}\int_0^\infty \exp(-x^2/\gamma^2)\cos x\,dx \tag{2}$$

and

$$G(\gamma)=\frac{2}{\pi}\int_0^\infty \exp(-y^2)\cos(\gamma y)\,dy. \tag{3}$$

The representation (3) is useful for evaluating averages

[1] Figures in brackets indicate the literature references at the end of this paper.

of squared-dipole radiation matrix elements. Because eq (1) is in a convenient form, it is not necessary to derive expansions which are valid for large γ and for small γ. This is not the case for the remaining two distributions, however.

2.2. Static Fields

A charged impurity can perturb lattice defects such as F centers by a number of different mechanisms. One such mechanism is the electric field produced by the impurity. The authors of [1] also compute the distribution in the magnitude of the electric field $|\mathbf{E}|$ and the distribution in the projection of $\mathbf{E}$ onto a specific direction.

When the Jahn-Teller effect is small, they find that the distribution in the magnitude of $|\mathbf{E}|=E$ is proportional to the Holtsmark function $H(\beta)$,

$$H(\beta)=\frac{2}{\pi\beta}\int_0^\infty dx\, x \sin x \exp\{-(x/\beta)^{3/2}\}, \quad (4)$$

where $\beta=a^{-2/3}E$ is dimensionless, and where $H(\beta)$ is normalized to unity, $\int_0^\infty H(\beta)\,d\beta=1$. The quantity $a^{2/3}$ is a characteristic electric field associated with the charged impurities imbedded in a dielectric host. Representation (4) is the convenient one from which to generate an expansion valid for large β. The representation,

$$H(\beta)=\frac{2\beta}{\pi}\int_0^\infty dy\, y \sin(\beta y)\exp(-y^{3/2}), \quad (5)$$

is the convenient representation from which to generate an expansion valid for small β and from which to evaluate averages of the dipole-radiation matrix element.

When the Jahn-Teller effect is large, the distribution in magnitude of the projection of $\mathbf{E}$ onto a specific direction is proportional to a distribution $H'(\beta)$ related to the Holtsmark distribution; namely,

$$H'(\beta)=\frac{1}{\pi\beta}\int_0^\infty dx \cos x \exp\{-(x/\beta)^{3/2}\}, \quad (6)$$

where $H'(\beta)$ has the normalization, $2\int_0^\infty H'(\beta)d\beta=1$.

Both functions H and H' are called Holtsmark functions. The function H' is intermediate between a Lorentzian and a Gaussian distribution. Representation (6) is convenient for developing an expansion valid for large β and the following representation,

$$H'(\beta)=\frac{1}{\pi}\int_0^\infty dy \cos(\beta y)\exp(-y^{3/2}), \quad (7)$$

readily leads to an expansion valid for small β. It is also the useful one from which to evaluate averages of squared-dipole radiation matrix elements.

When β has intermediate values near unity, the author finds that it is necessary to evaluate numerically the integrals in eqs (4) to (7). It is convenient for him to integrate by Gaussian quadratures with Legendre polynomials. The Legendre polynomials require a finite interval of integration. The semi-infinite interval $0\leq x\leq\infty$ is approximated by the interval $10^{-5}\,\beta\leq x\leq 6.34\,\beta$ when eqs (2), (4), and (6) are evaluated numerically in the present work. Expansions valid for $\beta\approx 1$ coverage slowly and are not competitive with the above numerical integration procedures when computation time is important. Likewise, asymptotic expansions which converge rapidly when β is very large or very small are more efficient than the above numerical integration procedures for such extreme values of β. The next two subsections contain summaries of the derivation for such series expansions.

2.3. Expansions for Large β

In this subsection, expansions for the distributions $H(\beta)$ and $H'(\beta)$ which are valid for $\beta>>1$ are derived. The representation (4) for $H(\beta)$ and the representation (6) for $H'(\beta)$ are convenient ones from which to begin. When $\alpha=\beta^{-3/2}$, the distributions become

$$H(\beta)=(2/\pi\beta)\,I(\alpha), \quad (8)$$

and

$$H'(\beta)=(1/\pi\beta)\,J(\alpha), \quad (9)$$

where

$$I(\alpha)=\int_0^\infty dx\, x \sin x \exp(-\alpha x^{3/2}), \quad (10)$$

and

$$J(\alpha)=\int_0^\infty dx \cos x \exp(-\alpha x^{3/2}). \quad (11)$$

Because the quantity α approaches zero in the limit as β approaches infinity, Taylor series expansions about $\alpha=0$ become useful representations for the functions $I(\alpha)$ and $J(\alpha)$.

Using the following limits

$$x \sin x=\frac{1}{2i}\left(-\operatorname*{Lim}_{p\to -i^+}+\operatorname*{Lim}_{p\to i^+}\right)\left(\frac{\partial}{\partial p}e^{-px}\right),$$

and

$$\cos x=\frac{1}{2}\left(\operatorname*{Lim}_{p\to -i^+}+\operatorname*{Lim}_{p\to i^+}\right)e^{-px},$$

and the Laplace transformed function

$$f(p;\,\alpha)=\int_0^\infty dx\,\exp\,(-px-\alpha x^{3/2}), \tag{12}$$

we write eqs (10) and (11) in the forms

$$I(\alpha)=\frac{1}{2i}\left(-\operatorname*{Lim}_{p\to -i^+}+\operatorname*{Lim}_{p\to i^+}\right)\frac{\partial}{\partial p}f(p;\,\alpha), \tag{13}$$

and

$$J(\alpha)=\frac{1}{2}\left(\operatorname*{Lim}_{p\to -i^+}+\operatorname*{Lim}_{p\to i^+}\right)f(p;\,\alpha). \tag{14}$$

Expanding $f(p;\alpha)$ in a Taylor's series about $\alpha=0$ and noting the Laplace transform

$$\int_0^\infty dx\,\exp\,(-px)\,x^s=\frac{\Gamma(s+1)}{p^{s+1}},$$

where $\Gamma(s+1)$ is the gamma function,

$$\Gamma\,(s+1)=\int_0^\infty dz\;z^s\;\exp\;(-z),$$

and where $s+1>0$, we have

$$I(\alpha)=\frac{1}{2i}\left(-\operatorname*{Lim}_{p\to -i^+}+\operatorname*{Lim}_{p\to i^+}\right)\sum_{n=0}^\infty \frac{(-\alpha)^n}{n!}\left(\frac{3n}{2}+1\right)\frac{\Gamma\left(\frac{3n}{2}+1\right)}{p^{(3n/2)}}$$

and

$$J(\alpha)=\frac{1}{2}\left(\operatorname*{Lim}_{p\to -i^+}+\operatorname*{Lim}_{p\to i^+}\right)\sum_{n=0}^\infty \frac{(-\alpha)^n}{n!}\frac{\Gamma\left(\frac{3n}{2}+1\right)}{p^{(3n/2)+1}}.$$

Inserting $-i=\exp\,(-\pi i/2)$ and $i=\exp\,(\pi/2)$ into the above equations gives us

$$I(\alpha)=-\sum_{n=0}^\infty \frac{(-\alpha)^n}{n!}\Gamma\left(\frac{3n}{2}+1\right)\left(\frac{3n}{2}+1\right)\sin\left(\frac{3\pi n}{4}\right), \tag{15}$$

and

$$J(\alpha)=\sum_{n=0}^\infty \frac{(-\alpha)^n}{n!}\Gamma\left(\frac{3n}{2}+1\right)\cos\left\{\left(\frac{3n}{2}+1\right)\frac{\pi}{2}\right\}. \tag{16}$$

The expansions for $H(\beta)$ and $H'(\beta)$ which are valid when $\beta\gg 1$, then become

$$H(\beta)=\frac{2}{\pi\beta}\left\{\left(\frac{\pi}{2}\right)^{1/2}\sum_{m=0}^\infty \frac{(6m+5)}{2}\frac{(6m+3)}{2}\cdots\frac{(6m+1)}{2}\cdots\frac{1}{2}\frac{\alpha^{2m+1}}{(2m+1)!}+\sum_{m=0}^\infty \frac{(6m+8)}{2}\frac{(6m+6)}{2}\cdots\frac{(6m+4)}{2}\cdots\frac{2}{2}\frac{\alpha^{2m+2}}{(2m+2)!}\right\}, \tag{17}$$

or

$$H(\beta)\underset{\beta\to\infty}{\rightrightarrows}\frac{15}{8}\left(\frac{2}{\pi}\right)^{1/2}\beta^{-5/2}+\frac{24}{\pi}\beta^{-4}+\frac{10395}{384}\left(\frac{2}{\pi}\right)^{1/2}\beta^{-11/2}+\cdots; \tag{18}$$

and

$$H'(\beta)=\frac{1}{\pi\beta}\left\{\left(\frac{\pi}{2}\right)^{1/2}\sum_{m=0}^\infty \frac{(6m+3)}{2}\frac{(6m+1)}{2}\cdots\frac{1}{2}\frac{\alpha^{2m+1}}{(2m+1)!}+\sum_{m=0}^\infty \frac{(6m+6)}{2}\frac{(6m+4)}{2}\cdots\frac{2}{2}\frac{\alpha^{2m+2}}{(2m+2)!}\right\}, \tag{19}$$

or

$$H'(\beta)\underset{\beta\to\infty}{\rightrightarrows}\left\{\frac{3}{4(2\pi)^{1/2}}\beta^{-5/2}+\frac{3\beta^{-4}}{\pi}+\frac{945\,\beta^{-11/2}}{192(2\pi)^{1/2}}+\cdots\right\}. \tag{20}$$

2.4. Expansions for Small β

In this subsection, expansions for the distributions $H(\beta)$ and $H'(\beta)$ which are valid for $\beta\ll 1$ are derived.

Substituting $y=x^{3/2}$ in eq (12) and representing $\exp\,(-py^{2/3})$ by the Taylor's series expansion

$$\exp\,(-py^{2/3})=\sum_{n=0}^\infty \frac{(-py^{2/3})^n}{n!}, \tag{21}$$

we obtain

$$f(p;\alpha)=\frac{2}{3}\sum_{n=0}^\infty \frac{(-p)^n}{n!}\frac{\Gamma\left(\frac{2n}{3}+\frac{2}{3}\right)}{\alpha^{[2(n+1)]/3}}. \tag{22}$$

Applying the operations which are indicated in eqs (13) and (14) to the representation (22) for $f(p;\alpha)$ gives us

$$I(\alpha)=\frac{2}{3}\sum_{n=2}^\infty \frac{\sin\left(\frac{\pi(n-1)}{2}\right)}{(n-1)!}\frac{\Gamma\left(\frac{2n}{3}+\frac{2}{3}\right)}{\alpha^{[2(n+1)]/3}}, \tag{23}$$

and

$$J(\alpha)=\frac{2}{3}\sum_{n=0}^\infty \frac{\cos\,(\pi n/2)}{n!}\frac{\Gamma\left(\frac{2n}{3}+\frac{2}{3}\right)}{\alpha^{[2(n+1)]/3}}. \tag{24}$$

501-968 O - 73 - 3

Hence, the expansions for small β are

$$H(\beta) = \frac{4}{3\pi} \sum_{m=0}^{\infty} (-1)^m \frac{\beta^{2m+2}}{(2m+1)!} \Gamma\left(\frac{4m+6}{3}\right), \quad (25)$$

or

$$H(\beta) \underset{\beta \to 0}{\rightarrow} \frac{4}{3\pi}\left[\beta^2 - \frac{\beta^4}{6}\Gamma\left(\frac{10}{3}\right) + \frac{\beta^6}{120}\Gamma\left(\frac{14}{3}\right) + \ldots\right]; \quad (26)$$

and

$$H'(\beta) = \frac{2}{3\pi} \sum_{m=0}^{\infty} (-1)^m \frac{\beta^{2m}}{(2m)!} \Gamma\left(\frac{4m+2}{3}\right), \quad (27)$$

or

$$H'(\beta) \underset{\beta \to 0}{\rightarrow} \frac{2}{3\pi}\left(\Gamma\left(\frac{2}{3}\right) - \frac{\beta^2}{2} + \frac{\beta^4}{24}\Gamma\left(\frac{10}{3}\right) + \ldots\right). \quad (28)$$

The first two terms of eqs (18) and (26) for the distribution $H(\beta)$ appear also in [3]. To the author's knowledge, the expansions given above for the distribution $H'(\beta)$ have not been reported previously.

3. Averages of Squared-Dipole Matrix Elements

Averaging the square of the dipole-radiation matrix elements over the distributions $G(\gamma)$, $H(\beta)$, and $H'(\beta)$ provides us with estimates of the effects which electric fields have on the lifetimes of relaxed F-center states. Discussions of these effects appear in [1]. It has been shown therein that the averages of the squares of the dipole radiation matrix elements over the distributions G, H, and H' are proportional to the following dimensionless expressions:

$$M_{\pm}^2[G;\gamma] = \frac{1}{2}\left[1 \pm \int_0^{\infty} \{1 + (\alpha/\gamma)^2\}^{-1/2} G(\alpha)\, d\alpha\right], \quad (29)$$

$$M_{\pm}^2[H;\beta] = \frac{1}{2}\left[1 \pm \int_0^{\infty} \{1 + (\alpha/\beta)^2\}^{-1/2} H(\alpha)\, d\alpha\right], \quad (30)$$

and

$$M_{\pm}^2[H';\beta] = \frac{1}{2}\left[1 \pm 2\int_0^{\infty} \{1 + (\alpha/\beta)^2\}^{-1/2} H'(\alpha)\, d\alpha\right]. \quad (31)$$

The ordering of the energy levels of the F center determines whether the plus or minus sign is used. The details are discussed in [1].

The integrals appearing in eqs (29) to (31) are evaluated by two methods. Both methods employ numerical integration by Gaussian quadratures [2]. The first method is more straightforward than the second method; but it requires in some cases more time for computation than the second method requires. In the first method, the distributions $G(\alpha)$, $H(\alpha)$, and $H'(\alpha)$ are computed explicitly. Values of $G(\alpha)$ for the region $0 \leq \alpha \leq \infty$ are given directly by eq (1). Values of $H(\alpha)$ and $H'(\alpha)$ are given by the following prescription. They are obtained when $1 \leq \alpha \leq 6$ by applications of Gaussian quadratures to the respective representations (4) and (6). The respective expansions (18) and (20) for $H(\alpha)$ and $H'(\alpha)$ are used when $\alpha \gg 6$; and the respective expansions (26) and (28) are used when $\alpha \ll 1$. These values for the distributions $G(\alpha)$, $H(\alpha)$, and $H'(\alpha)$ then are inserted into the integrands of eqs (29) to (31). Finally, the integrals are evaluated by Gaussian quadratures.

The second method does not involve explicit evaluations of the distributions. Instead, the representations (3), (5), and (7) are inserted respectively into eqs (29) to (31), namely,

$$M_{\pm}^2[G;\gamma] = \frac{1}{2} \pm \frac{1}{\pi}\int_0^{\infty} d\alpha \int_0^{\infty} dy\, \{1 + (\alpha/\gamma)^2\}^{-1/2} \exp(-y^2) \cos(\alpha y), \quad (32)$$

$$M_{\pm}^2[H;\beta] = \frac{1}{2} \pm \frac{1}{\pi}\int_0^{\infty} d\alpha \int_0^{\infty} dy\, \{1 + (\alpha/\beta)^2\}^{-1/2} \exp(-y^{3/2}) \alpha y \sin(\alpha y), \quad (33)$$

and

$$M_{\pm}^2[H';\beta] = \frac{1}{2} \pm \frac{1}{\pi}\int_0^{\infty} d\alpha \int_0^{\infty} dy\, \{1 + (\alpha/\beta)^2\}^{-1/2} \exp(-y^{3/2}) \cos(\alpha y). \quad (34)$$

The integrations over α then are performed by referring to several equations in section 9.6 of [2]. The results are

$$\int_0^{\infty} \{1 + (\alpha/\beta)^2\}^{-1/2} \cos(\alpha y)\, d\alpha = \beta K_0(\beta y), \quad (35)$$

and

$$\int_0^{\infty} \{1 + (\alpha/\beta)^2\}^{-1/2} \alpha \sin(\alpha y)\, d\alpha = \beta^2 K_1(\beta y), \quad (36)$$

where $\beta y \geq 0$ and where K_0 and K_1 denote, respectively, the modified Bessel functions of zero and first order. Insertion of eqs (35) and (36) into eqs (32) to (34) yields the following expressions:

$$M_{\pm}^2[G;\gamma] = \frac{1}{2} \pm \frac{\gamma}{\pi}\int_0^{\infty} dy \exp(-y^2) K_0(\gamma y), \quad (37)$$

$$M_{\pm}^2[H;\beta] = \frac{1}{2} \pm \frac{\beta^2}{\pi}\int_0^{\infty} dy \exp(-y^{3/2}) y K_1(\beta y), \quad (38)$$

and

$$M_{\pm}^{2}[H';\beta]=\frac{1}{2}\pm\frac{\beta}{\pi}\int_{0}^{\infty}dy\,\exp(-y^{3/2})K_{0}(\beta y). \quad (39)$$

The modified Bessel functions are evaluated according to their polynomial approximations given in section 9.8 of [2]. The final step of the second method consists of the numerical integration of eqs (37) to (39) by Gaussian quadratures.

Eash of these two methods has its advantages. The decision as to which method is most suitable depends upon the values of γ and β and upon the other types of calculations included in the computer program.

4. Conclusions

We conclude this paper by presenting some numerical results. Table 1 gives values of $G(\beta)$, $H(\beta)$, and $H'(\beta)$ for $0 \leq \beta \leq 10.0$. Table 2 contains the values of M_{+}^{2} for each of the three distribution functions. The respective values of M_{-}^{2} follow from the relation $M_{-}^{2}=1-M_{+}^{2}$.

TABLE 1. *The distribution functions* G(β), H(β) *and* H'(β)

All quantities are dimensionless.

β	$G(\beta)$	$H(\beta)$	$H'(\beta)$
0.0	0.56	0.00	0.29
.04	.56	.00	.29
.1	.56	.004	.29
.4	.54	.06	.27
1.0	.44	.27	.20
4.0	.01	.08	.01
10.0	.00	.01	.00

TABLE 2. *The square of the dipole-matrix elements averaged over the three distributions* G, H, *and* H'

All quantities are dimensionless.

β	$M_{+}^{2}[G;\gamma=\beta]$	$M_{+}^{2}[H;\beta]$	$M_{+}^{2}[H';\beta]$
0.01	0.51	0.50	0.51
.04	.54	.51	.54
.1	.59	.53	.59
.4	.74	.61	.73
1.0	.85	.72	.84
4.0	.97	.91	.96
10.0	.99	.97	.99

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Wavelengths and Energy Levels of the Second Spectrum of Cerium (Ce II)

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The second spectrum of cerium (Ce II) has been compiled in the wavelength region between 2500 Å and 24 000 Å. Of the 11 000 lines in the list, about 7500 are now classified as transitions between 192 odd levels and 288 even levels. The odd levels arise from 5 configurations ($4f5d^2$, $4f5d6s$, $4f6s^2$, $4f^26p$, and $4f^3$) and the even levels from 7 configurations ($4f^26s$, $4f^25d$, $4f5d6p$, $4f6s6p$, $5d^3$, $5d^26s$, and $5d6s^2$). The known levels extend up to only 52 000 cm^{-1} although the ionization potential is known to be 35 000 cm^{-1} higher.

Key words: Cerium; Ce II; energy levels; spectrum; wavelengths.

1. Introduction

About forty years ago George R. Harrison and Walter E. Albertson [1934][1] at the new M.I.T. Spectroscopy Laboratory photographed the spectrum of the cerium arc from 2500 to 5000 Å at a dispersion of 0.4 Å/mm. The precision of the wavelengths they measured was adequate to permit Albertson and Harrison [1937] to establish an array of 31 low odd ($4f5d^2$ and $4f5d6s$) levels and 51 high even ($4f5d6p$ and $4f^25d$) levels which accounted for 584 of their lines. These levels were established simply on the basis of intervals in their list of wave numbers that repeated significantly more than the statistically expected number of times.

These levels were confirmed and interpreted to some extent by Harrison, Albertson, and Hosford [1941] with the aid of Zeeman patterns photographed from Bitter's large solenoidal magnet operating at fields up to 9.6 teslas (96 000 gauss). They reported Zeeman patterns for 427 classified lines in the range 2600 to 7000 Å. They extended the earlier energy system to 75 low odd and 162 high even levels and found a second system, which they were unable to connect with the first, consisting of 39 low even ($4f^26s$ and $4f^25d$) levels and 40 high odd ($4f^26p$ and $4f^3$) levels. They provided g-values for 280 of these 316 levels.

The outbreak of war effectively put a stop to any further work on Ce II at M.I.T. They were left with a list of about 7000 lines of which 3600 were classified. In 1949, after spending many months assigning designations to the levels, Albertson sent his analysis to Dr. Meggers at NBS. It is of interest here to quote remarks from his accompanying letter, dated August 6, 1949, concerning the structure of Ce II.

> "The large number of levels in Ce II require many electron configurations to explain their origin. It has long been recognized that in the general vicinity of cerium (on the periodic table) that the $4f$, $5d$, and $6s$ electrons are all of near the same energy and in competition with each other. This competition is quite marked in lanthanum and cerium. As you recall, you and Russell found all combinations of the $6s$, $6p$, $5d$ and $4f$ electrons taken two at a time, in La II. Not only that but you found almost all the terms arising from them. The same holds true (but to a considerably lesser extent regarding terms) in the three electron spectrum of Ce II.
>
> The possible combinations of the $6s$, $6p$, $5d$, and $4f$ electrons, taken three at a time are: (1) $4f^3$, $4f^25d$, $4f^26s$, $4f^26p$; (2) $4f5d^2$, $4f6s^2$, $4f6p^2$, $4f5d6s$; (3) $4f5d6p$, $4f6s6p$, $5d^3$, $5d^26s$; (4) $5d^26p$, $5d6s6p$; (5) $5d6s^2$; (6) $5d6p^2$, $6s^26p$, $6s6p^2$, $6p^3$.
>
> Of the 19 theoretical electron configurations, those from the groups (4) and (6) would be expected to be too high to be found from the energy levels under study. $5d6s^2$ would be expected to be difficult to find since it would give rise to only two levels, both of which would be subject to considerable perturbation by neighboring levels of same J-value. Of the 12 electron configurations comprising the groupings (1), (2), and (3) above, positive evidence for the existence of all in the structure of Ce II has been found, with the single exception of $4f6p^2$. In addition, the levels of $5d6s^2$ have been assigned, but they are uncertain, so no strong claims for $5d6s^2$ are made."

In 1955 he sent his line list to NBS and a copy was forwarded to G. Racah at the Hebrew University of Jerusalem. Racah [1955] had recently found that the low $4f5d^2$ and $4f5d6s$ levels lay 3854 cm^{-1} below the low $4f^26s$ and $4f^25d$ levels, by using the infrared line list of Kiess et al. [1921], and he was applying his methods of parametric analysis to the interpretation of Ce II and other rare-earth spectra. In addition Racah had by 1957 found 14 new levels below 14000 cm^{-1} in the low odd configurations $4f5d^2+4f5d6s+4f6s^2$.

[1] Literature references at the end of the paper.

Some years before Racah's death in 1965, work on the analysis of Ce II had been taken over by one of Racah's students, Zipora Goldschmidt, who published in 1968 a comprehensive thesis entitled "Theoretical Investigation of Rare-Earth Spectra." Her treatment of Ce II is particularly thorough, with detailed calculations for all seven of the known even configurations and four of the five known odd configurations. She identified the $4f6s^2$ configuration and changed many of Albertson's assignments on the basis of her diagonalizations and least squares adjustments. Predictions were made for all the missing levels of the eleven configurations. These were most helpful in guiding the later searches at NBS. Furthermore she continued studying the experimental data, finding 50 good new levels, rejecting about 20 of the levels found at M.I.T. and correcting the J-values of several.

In 1970 it was decided to prepare a new line list for Ce II based on new observations, search for the missing levels of the eleven configurations predicted by Goldschmidt, and publish a complete line list with classifications. Such a list for Ce II had never yet been published.

2. Wavelengths

Over the past fifty years at least nine extensive lists of cerium spectra have been prepared. They are listed in table 1. Three of them have not been published. The first unpublished list, that of Albertson [1939], was prepared from observations with 10 m gratings at plate factors of 0.4 Å/mm using cerium arcs. It covers the range 2500 to 5000 Å fairly completely, but does not separate Ce I from Ce II. Later, to provide needed wavelengths in the infrared for the NBS Intensity Tables, Corliss [1955] observed the region 6700 to 11 000 Å with cerium arcs and a 6.3 m Wadsworth spectrograph at a plate factor of 5 Å/mm.

TABLE 1. *Line lists available for cerium spectra*

Reference	Date	Wavelength range Å	No. of lines	Ref. symbol
Klein	[1918]	2500– 4600	2500	PK
Kiess et al.	[1921]	5500– 9000	1700	CK
King	[1928]	3000– 7000	1360	AK
Harrison	[1939]	2100– 8800	5755	MT
Albertson	[1939]	2500– 7300	7000	WA
Gatterer & Junkes	[1945]	2200– 7400	3200	GJ
Corliss	[1955]	6700–11300	1260	CC
Meggers, Corliss & Scribner.	[1961]	2460– 8900	1700	MC
Martin, Corliss & Blanc	[1965]	3290–10300	9000	MB

The third unpublished list is a very extensive set of observations prepared in connection with the analysis of Ce I undertaken by William C. Martin [1963] and [1971] at the National Bureau of Standards. An entirely new description of cerium spectra (Ce I and Ce II) was prepared by Martin, Corliss, and Marie Blanc, for the region 3300 to 10 000 Å using high-voltage a.c. arcs, hollow-cathodes and electrodeless lamps described by Corliss, Bozman, and Westfall [1953]. These observations were made at plate factors between 1 and 5 Å/mm. Comparison of relative intensities from the several light sources permitted the definite assignment of most lines to either Ce I or Ce II. Later more accurate wavelengths were measured at NBS by Marie Blanc for lines between 3800 and 7100 Å on spectrograms of electrodeless discharges made for us by J. Conway and E. F. Worden, Jr. in the eighth through fifteenth orders of a 3 m Czerny-Turner spectrograph at the University of California. These exposures favored Ce I but permitted improvement in most of the wavelengths for Ce II. All of these new measurements were used to assemble two lists, one of about 25 000 lines of Ce I and one of Ce II consisting of about 9000 wavelengths in the range 3290 to 10 300 Å (the last entry in table 1). In view of the high density of Ce I lines at wavelengths longer than 4500 Å, the possibility of blending with Ce II lines in some cases is very real. Lines likely to be blended are marked "b" in the line list.

To prepare a working list of Ce II lines that would be as complete and accurate as practicable, all of the Ce II lines from the nine available lists (shown in table 1) were punched on cards and sorted by wavelength. To evaluate the relative accuracy of the lists all possible transitions between the known even and odd levels were calculated for the range 2000 to 12 000 Å and compared with the measured values. It soon became evident that the unpublished list of Albertson [1939] was the best available from 2500 to 3290 Å, that of Martin, Corliss, and Blanc [1965] from 3290 to 10 300 Å and that of Corliss [1955] from about 8900 to 11 300 Å. A master list of 11 883 lines between 2500 and 11 000 A was assembled, mainly from those three lists but with a few lines from the other lists given in table 1. This became the working list with which the analysis was to be extended.

A description of the general physical features of the spectrum would not be out of place here. In a light source operating at about 6000 K the cerium is over 99 percent ionized. A rather featureless spectrum starts near 2500 Å with a line density about one line/Å, increasing through 3 lines/Å at 3000 Å to a narrow peak of 8 or 10 lines/Å between 3700 Å and 4050 Å. The line density of Ce II then gradually trails off through 3 lines/Å at 4400 Å, one line/Å at 5000 Å to about one line every 5 Å at 8000 Å. A very dense background of faint Ce I lines appears at 4500 Å and begins to dominate the spectrum above 4800 Å.

The strongest lines of Ce II lie between 3800 and 4200 Å. Nearly all of the strong lines belong to one of three transition arrays. For example, of the 28 lines with intensity 1000 or more in table 4, 11 lines are from fds–fdp, 10 from f^2s–f^2p and 7 from fd^2–fdp. The strongest line is at 4186.596 Å with an intensity 2500 on our scale. The transition is $4f^26s\ {}^4H_{6\,1/2}$ – $4f^26p\ {}^4I^\circ_{7\,1/2}$.

3. Establishment of Energy Levels

The computer processing of the line list and the searches for new energy levels were carried out on the NBS Univac 1108 using the programs called "Combo," written by Jack Tech. The search portion of the program is based on the principle of adding or subtracting the wavenumber of every line to every level and noting sums or differences which repeat within a given tolerance more than a given number of times. (This procedure was proposed and programmed for an earlier NBS computer by G. Racah during a visit here in 1958.)

Starting with the known low odd levels which include the $4f5d^2$ ground configuration, improved values were determined for the low even levels by using the new values for wavelengths longer than 5600 Å. This improved the accuracy of Racah's connection between the two systems. The combinations between the low odd and high even levels (4600 lines) and between the low even and high odd levels (900 lines) were found and removed from the line list. A number of the "known" levels were found to be unreal on the basis of precision and number of combinations. With the 6400 remaining unclassified lines, searches were carried out for the undiscovered levels predicted in the four odd and seven even configurations calculated by Goldschmidt (1968).

The energy levels of $4f^3$, which had not been calculated by Goldschmidt, were predicted by comparison with $4f^3$ found in Pr III by Sugar (1963). Compressing the scale of intervals between Pr III levels by 0.65 and adding 38 000 cm^{-1}, the height of the lowest $4f^3$ term in Ce II, resulted in successful identification of all the known f^3 levels below 50 000 cm^{-1}. The ^4S, predicted to lie at 45 700 cm^{-1}, remains undiscovered, as well as those terms above 50 000 cm^{-1}. The $4f^3$ configuration has since been calculated by Mrs. Goldschmidt. Amongst the other odd configurations, numerous additions were made to $4f5d^2$ and $4f^26p$.

Nearly all of the 47 even levels found at this time belong to $4f^25d$ and lie between 10 000 and 28 000 cm^{-1}. A large fraction of the lines contributing to their discovery have wavelengths longer than 5000 Å where the older line lists were inadequate.

In 1971, after I had terminated this program of searches, Mrs. Z. Goldschmidt (during a sabbatical year at the NBS Spectroscopy Section) encouraged me to resume the searches for undiscovered terms, particularly those based on $4f^2(^1I_6)$. With the help of new diagonalizations and least squares calculations and improved precision of energy level values, we found the correct levels for terms of the configurations $4f^2(^1I_6)6s$ and $4f^2(^1I_6)6p$, most of which had previously been assigned to spurious levels. About a dozen more $4f^25d$ levels were also found at this time.

The odd term $4f5d^2\ ^2K°$ was found by means of four strong combinations with the two $4f5d6p\ ^2I$ terms, which were among the strongest of the remaining unclassified lines. We also found the $4f^3\ ^2K°$. Then with the help of these $^2K°$ terms and the old $4f^3\ ^4I°_{7\frac{1}{2}}$ we found $4f^25d\ ^2L$, the term with the highest L-value identified in the spectrum.

Since the present paper represents the culmination of six successive efforts to find energy levels in Ce II, it is appropriate to summarize the contribution of each to the total number of levels now regarded as real.

Symbol	Reference	Odd	Even	Total
A	Albertson et al. [1937]	31	50	81
H	Harrison et al. [1941]	79	136	215
R	Racah [1957, unpublished]	14	.....	14
G	Goldschmidt [1968]	19	31	50
C	Corliss [1971, unpublished]	29	47	76
B	Corliss & Goldschmidt [1972, unpubl.]	20	24	44
	Totals	192	288	480

About 1600 lines were classified by the new levels (C and B).

4. Results

Observational spectroscopists are interested in the classification of lines that appear in laboratory or stellar spectra that they have observed. In such cases the spectrum of a particular ion is usually only partially developed, which means that information is required for only stronger lines of the spectrum. This need is generally satisfied by a moderately complete description and analysis. In the present spectrum, there are 666 lines in our line list which are of intensity 100 or greater. Only one of these lines has not been classified. Less than 1 percent of the 1690 Ce II lines strong enough to be listed in the NBS Tables of Spectral-Line Intensities remain unclassified.

In most spectra there are usually some terms which make only a few combinations and in cases where these combinations are faint it may be difficult to discover missing levels without an extremely complete and precise line list. In the case of Ce II there are 232 odd levels predicted for the five known odd configurations $4f5d^2$, $4f5d6s$, $4f6s^2$, $4f^26p$, and $4f^3$. Of these 192 have been found. There are 305 even levels predicted for the seven known even configurations $4f^26s$, $4f^25d$, $4f5d6p$, $4f6s6p$, $5d^3$, $5d^26s$, and $5d6s^2$. Of these 288 have been found.

The 40 levels missing from the five known odd configurations fall into two categories; either they have J-values of 7/2 or less, or they are predicted to lie above 53 000 cm^{-1}. In either case, transitions would tend to faintness. All but four of the missing levels belong to $4f^26p$ or $4f^3$ and are predicted to lie above 40 000 cm^{-1}.

All 17 missing even levels have J-values of 1/2 (9 levels), 3/2 (6 levels) or 5/2 (2 levels).

The work reported in this paper is concerned exclusively with preparing a line list, establishing energy levels and classifying spectrum lines; the theoretical predictions and interpretations have been carried out by Goldschmidt, who will publish them separately.

A. Energy Levels

The energy levels of Ce II will eventually appear in three publications: (1) in a volume of the general com-

pilation "Atomic Energy Levels" covering the rare-earth spectra now in preparation by W. C. Martin and colleagues in the Spectroscopy Section of NBS, (2) in Goldschmidt's paper and (3) here. It is often helpful to the user for tables of material as complex as this to be made available in various formats. In "AEL", levels of both parities are arranged in a single table by energy value with subgroupings by terms when the mixing of terms is small. In Goldschmidt's thesis the odd levels were grouped by terms and the even levels by J-value. The term tables in the present paper serve as an index for detailed information about the levels listed numerically with each classified line. Here convenience requires tabulation in numerical order.

The odd levels are listed in table 2 and the even levels in table 3. The configuration and term symbol of the largest component in the calculated eigenvector of the level are listed in the first two columns. These are followed by the J-value, observed level value, and observed g-value in the next three columns. The g-values are from Harrison et al. [1941]. The percentage contributed by the leading term to the composition of the level is given in the sixth column followed in columns 7 and 8 by the percentage and designation of the term which makes the second largest contribution to the composition of the level. The composition is from Goldschmidt [1972].

In some cases, more than one level of a given J may have the first percentage from the same term. Note, for example, that both the ground level of Ce II and the level at 1874 cm^{-1} have the same leading component, $4f(^2F^\circ)5d^2(^3F)\,^4H^\circ_{3\frac{1}{2}}$, and that the ground level also has a larger component of $4f(^2F^\circ)5d^2(^3F)\,^2G^\circ_{3\frac{1}{2}}$, than does any other level. For this reason the leading component cannot always serve as a designation. Very few of the levels of Ce II have more than 99 percent purity, but if the second contribution is less than one percent, it is omitted. If the second component is from a different configuration, it is so indicated. The last columns show the approximate number of combinations made by each level and the symbol (as listed at the end of sec. 3) for the discoverer of the level.

The levels of the $4f^26p$ configuration were calculated in a J_{1j} scheme made obvious by the notation for components from this configuration in table 1.

The f^3 configuration has more than one term of a particular type (defined by the values of S and L) for certain SL combinations, and Goldschmidt's calculations used Racah's group-theoretical separations of such repeating terms. A component from such a term of $4f^3$ in table 1 has an ordinal number following the usual term symbol. The correspondence between this ordinal number and the appropriate set of group-theoretical numbers for the term is given by Nielson and Koster [1963].

B. Spectrum lines

The table of observed Ce II lines (table 4), consists of 11 000 lines in the wavelength range from 2500 to 24 000 Å. About 7500 of these lines are classified as transitions between the levels listed in tables 2 and 3. The wavelengths below 9000 Å are given to 3 decimal places; those above, to 2. The visually estimated intensities are on a scale which is adjusted below 4800 Å to be about ten times the scale used in Meggers, Corliss, and Scribner [1961]. The strongest line has an intensity of 2500. Above 4800 Å the scale grows somewhat larger. Lines beyond 11 000 Å are all taken from the list of Verges, Corliss, and Martin [1972]. Lines likely to be blended with Ce I lines are indicated with "b" following the intensity.

TABLE 2. *Odd energy levels of* Ce II

First component							Second component		
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$4f(^2F^\circ)5d^2(^3F)$	$^4H^\circ$	$3\frac{1}{2}$	0.000	0.794	48	35	$(^2F^\circ)(^3F)\ ^2G^\circ$	72	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4I^\circ$	$4\frac{1}{2}$	987.611	0.948	30	24	$(^2F^\circ)(^3F)\ ^2G^\circ$	64	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4I^\circ$	$4\frac{1}{2}$	1410.304	0.856	49	22	$(^2F^\circ)(^3F)\ ^4H^\circ$	66	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4H^\circ$	$3\frac{1}{2}$	1873.934	0.806	43	18	$(^2F^\circ)(^3F)\ ^2G^\circ$	80	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^2S^\circ$	$\frac{1}{2}$	2140.492	0.985	26	23	$(^2F^\circ)(^1D)\ ^2P^\circ$	26	*H*
$4f5d(^1G^\circ)6s$	$^2G^\circ$	$4\frac{1}{2}$	2382.246	1.039	33	18	$4f(^2F^\circ)5d^2(^3F)\ ^4H^\circ$	79	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4I^\circ$	$5\frac{1}{2}$	2563.233	0.968	94	2	$(^2F^\circ)(^1D)\ ^2H^\circ$	35	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4H^\circ$	$4\frac{1}{2}$	2581.257	1.023	35	21	$(^2F^\circ)(^3F)\ ^2G^\circ$	70	*A*
$4f5d(^3F^\circ)6s$	$^4F^\circ$	$1\frac{1}{2}$	2595.644	0.516	72	21	$(^1D^\circ)\ ^2D^\circ$	68	*A*
$4f5d(^3F^\circ)6s$	$^2F^\circ$	$2\frac{1}{2}$	2634.666	0.957	26	21	$4f(^2F^\circ)5d^2(^1D)\ ^2F^\circ$	81	*A*
$4f5d(^1G^\circ)6s$	$^2G^\circ$	$3\frac{1}{2}$	2641.559	0.829	44	29	$(^3H^\circ)\ ^4H^\circ$	84	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4H^\circ$	$5\frac{1}{2}$	2879.695	1.123	92	2	$(^2F^\circ)(^1D)\ ^2H^\circ$	41	*A*

TABLE 2. *Odd energy levels of* Ce II—Continued

First component						Second component			
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$4f5d(^3F^\circ)6s$	$^4F^\circ$	$2^1/_2$	3363.427	0.995	43	18	$4f(^2F^\circ)5d^2(^3F)$ $^2F^\circ$	94	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^2S^\circ$	$^1/_2$	3508.470	1.262	52	27	$(^2F^\circ)(^3F)$ $^4D^\circ$	32	*H*
$4f5d(^1G^\circ)6s$	$^2G^\circ$	$4^1/_2$	3593.882	0.988	26	25	$4f(^2F^\circ)5d^2(^1D)$ $^2H^\circ$	76	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^2F^\circ$	$3^1/_2$	3703.594	1.085	20	16	$(^2F^\circ)(^3F)$ $^2G^\circ$	89	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4D^\circ$	$1^1/_2$	3745.475	1.240	58	16	$(^2F^\circ)(^3P)$ $^4D^\circ$	47	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4I^\circ$	$6^1/_2$	3793.634	1.128	68	24	$(^2F^\circ)(^3F)$ $^4H^\circ$	25	*H*
$4f5d(^3H^\circ)6s$	$^4H^\circ$	$3^1/_2$	3995.460	0.879	51	18	$(^3F^\circ)$ $^4F^\circ$	85	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4F^\circ$	$1^1/_2$	4201.893	0.528	54	15	$(^2F^\circ)(^1D)$ $^2D^\circ$	54	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4H^\circ$	$6^1/_2$	4203.934	1.189	69	29	$(^2F^\circ)(^3F)$ $^4I^\circ$	21	*H*
$4f5d(^3G^\circ)6s$	$^2G^\circ$	$3^1/_2$	4266.397	0.964	27	26	$(^3G^\circ)$ $^4G^\circ$	88	*A*
$4f5d(^3G^\circ)6s$	$^4G^\circ$	$2^1/_2$	4322.708	0.766	30	28	$4f(^2F^\circ)5d^2(^3F)$ $^4G^\circ$	82	*A*
$4f5d(^3F^\circ)6s$	$^4F^\circ$	$3^1/_2$	4459.872	1.134	57	10	$4f(^2F^\circ)5d^2(^1D)$ $^2G^\circ$	92	*A*
$4f5d(^3G^\circ)6s$	$^4G^\circ$	$2^1/_2$	4511.257	0.731	63	10	$(^3F^\circ)$ $^4F^\circ$	83	*A*
$4f5d(^3H^\circ)6s$	$^4H^\circ$	$4^1/_2$	4523.033	0.978	84	4	$4f(^3F^\circ)5d^2(^1D)$ $^2H^\circ$	71	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4D^\circ$	$2^1/_2$	4737.373	1.021	41	33	$(^2F^\circ)(^3F)$ $^4G^\circ$	75	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4F^\circ$	$1^1/_2$	4844.644	0.699	29	25	$4f5d(^1D^\circ)6s$ $^2D^\circ$	56	*A*
$4f5d(^3H^\circ)6s$	$^4H^\circ$	$5^1/_2$	4910.963	1.095	32	26	$(^3H^\circ)$ $^2H^\circ$	47	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4F^\circ$	$2^1/_2$	5010.870	1.038	80	7	$(^2F^\circ)(^3P)$ $^4F^\circ$	76	*A*
$4f5d(^1D^\circ)6s$	$^2D^\circ$	$2^1/_2$	5118.806	1.152	43	17	$4f(^2F^\circ)5d^2(^3F)$ $^4D^\circ$	86	*A*
$4f(^2F^\circ)5d^2(^1D)$	$^2P^\circ$	$^1/_2$	5283.029	0.566	34	31	$(^2F^\circ)(^3F)$ $^4D^\circ$	36	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4G^\circ$	$3^1/_2$	5437.422	0.999	54	23	$4f5d(^3G^\circ)6s$ $^4G^\circ$	76	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4I^\circ$	$7^1/_2$	5455.845	1.196	99			6	*H*
$4f5d(^3H^\circ)6s$	$^4H^\circ$	$5^1/_2$	5651.357	1.085	49	15	$4f(^2F^\circ)5d^2(^3F)$ $^2I^\circ$	50	*H*
$4f5d(^3F^\circ)6s$	$^4F^\circ$	$4^1/_2$	5675.763	1.241	71	16	$(^3G^\circ)$ $^4G^\circ$	74	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4G^\circ$	$3^1/_2$	5716.216	1.009	37	34	$4f5d(^3G^\circ)6s$ $^4G^\circ$	78	*A*
$4f5d(^3G^\circ)6s$	$^4G^\circ$	$4^1/_2$	5819.113	1.189	26	21	$4f(^2F^\circ)5d^2(^1D)$ $^2G^\circ$	75	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^2P^\circ$	$1^1/_2$	5924.204	1.241	26	25	$(^2F^\circ)(^1D)$ $^2P^\circ$	59	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4F^\circ$	$3^1/_2$	5942.798	1.145	26	22	$(^2F^\circ)(^3F)$ $^4D^\circ$	81	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4F^\circ$	$3^1/_2$	5964.896	1.332	45	29	$(^2F^\circ)(^3F)$ $^4D^\circ$	74	*H*
$4f(^2F^\circ)5d^2(^1G)$	$^2I^\circ$	$5^1/_2$	5969.007	0.954	32	30	$(^2F^\circ)(^3F)$ $^2I^\circ$	46	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4G^\circ$	$4^1/_2$	6389.942	1.154	66	19	$4f5d(^3G^\circ)6s$ $^4G^\circ$	67	*A*
$4f5d(^3F^\circ)6s$	$^2F^\circ$	$2^1/_2$	6517.619	0.954	14	14	$(^3D^\circ)$ $^2D^\circ$	72	*H*
$4f5d(^3D^\circ)6s$	$^2D^\circ$	$1^1/_2$	6521.332	0.924	28	27	$(^3D^\circ)$ $^4D^\circ$	66	*H*
$4f5d(^3F^\circ)6s$	$^2F^\circ$	$2^1/_2$	6549.908		20	15	$(^1D^\circ)$ $^2D^\circ$	82	*R*
$4f(^2F^\circ)5d^2(^3F)$	$^4F^\circ$	$4^1/_2$	6638.258	1.215	27	26	$4f5d(^3G^\circ)6s$ $^4G^\circ$	62	*A*
$4f5d(^3H^\circ)6s$	$^4H^\circ$	$6^1/_2$	6913.392	1.217	95	2	$4f(^2F^\circ)5d^2(^3F)$ $^2I^\circ$	17	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4F^\circ$	$4^1/_2$	7059.072	1.222	53	9	$(^2F^\circ)(^3F)$ $^4G^\circ$	70	*H*
$4f5d(^3D^\circ)6s$	$^4D^\circ$	$^1/_2$	7061.838		95	2	$(^1P^\circ)$ $^2P^\circ$	35	*G*

TABLE 2. *Odd energy levels of* Ce II—Continued

First component									
Configuration	Term	J	Level	g	%	Second component		n, ref.	
			cm^{-1}						
$4f(^2F^\circ)5d^2(^3P)$	$^4G^\circ$	$2^1/_2$	7202.529	1.106	91	3	$4f5d(^3F^\circ)6s\ ^2F^\circ$	68	*H*
$4f5d(^3G^\circ)6s$	$^4G^\circ$	$5^1/_2$	7233.627	1.266	80	14	$4f(^2F^\circ)5d^2(^3F)\ ^4G^\circ$	35	*H*
$4f5d(^3F^\circ)6s$	$^2F^\circ$	$3^1/_2$	7259.075	1.140	39	18	$4f(^2F^\circ)5d^2(^3F)\ ^2F^\circ$	83	*A*
$4f(^2F^\circ)5d^2(^3F)$	$^4P^\circ$	$1^1/_2$	7278.922		85	6	$(^2F^\circ)(^3F)\ ^2P^\circ$	46	*R*
$4f(^2F^\circ)5d^2(^3F)$	$^2I^\circ$	$6^1/_2$	7293.938	1.100	48	37	$(^2F^\circ)(^1G)\ ^2I^\circ$	24	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4P^\circ$	$^1/_2$	7522.458		84	12	$(^2F^\circ)(^3F)\ ^2S^\circ$	29	*G*
$4f(^2F^\circ)5d^2(^3F)$	$^4G^\circ$	$5^1/_2$	7522.622	1.248	78	16	$4f5d(^3G^\circ)6s\ ^4G^\circ$	36	*H*
$4f(^2F^\circ)5d^2(^1G)$	$^2H^\circ$	$4^1/_2$	7713.089	0.950	28	26	$(^2F^\circ)(^3F)\ ^2H^\circ$	65	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4P^\circ$	$2^1/_2$	7746.185		77	7	$4f5d(^3D^\circ)6s\ ^2D^\circ$	73	*R*
$4f5d(^3D^\circ)6s$	$^4D^\circ$	$1^1/_2$	7818.147	1.099	67	14	$(^1D^\circ)\ ^2D^\circ$	60	*H*
$4f(^2F^\circ)5d^2(^3P)$	$^4G^\circ$	$3^1/_2$	7878.328	1.195	83	5	$4f5d(^3G^\circ)6s\ ^2G^\circ$	71	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^4S^\circ$	$1^1/_2$	8169.698		66	14	$(^2F^\circ)(^1D)\ ^2P^\circ$	48	*G*
$4f5d(^3D^\circ)6s$	$^4D^\circ$	$2^1/_2$	8175.863	1.271	75	7	$(^1F^\circ)\ ^2F^\circ$	73	*H*
$4f(^2F^\circ)5d^2(^3P)$	$^2D^\circ$	$2^1/_2$	8280.946	1.189	48	7	$(^2F^\circ)(^3F)\ ^4D^\circ$	73	*A*
$4f5d(^3D^\circ)6s$	$^4D^\circ$	$3^1/_2$	8402.668	1.343	69	13	$(^1F^\circ)\ ^2F^\circ$	73	*H*
$4f(^2F^\circ)5d^2(^3P)$	$^2D^\circ$	$1^1/_2$	8702.444		50	11	$(^2F^\circ)(^3F)\ ^2D^\circ$	47	*R*
$4f(^2F^\circ)5d^2(^3P)$	$^4G^\circ$	$4^1/_2$	8804.224	1.160	69	9	$4f5d(^3G^\circ)6s\ ^2G^\circ$	50	*H*
$4f5d(^3H^\circ)6s$	$^2H^\circ$	$5^1/_2$	8927.514	1.071	36	31	$4f(^2F^\circ)5d^2(^3F)\ ^2H^\circ$	45	*H*
$4f(^2F^\circ)5d^2(^1G)$	$^2G^\circ$	$3^1/_2$	9198.326		64	16	$(^2F^\circ)(^3P)\ ^2G^\circ$	63	*G*
$4f(^2F^\circ)5d^2(^3P)$	$^4D^\circ$	$^1/_2$	9269.826		41	35	$(^2F^\circ)(^3F)\ ^2P^\circ$	27	*G*
$4f5d(^3P^\circ)6s$	$^4P^\circ$	$^1/_2$	9491.493		97	1	$(^1P^\circ)\ ^2P^\circ$	26	*G*
$4f5d(^3P^\circ)6s$	$^4P^\circ$	$1^1/_2$	9634.186	1.690	87	4	$(^1P^\circ)\ ^2P^\circ$	57	*H*
$4f(^2F^\circ)5d^2(^1G)$	$^2G^\circ$	$4^1/_2$	9723.335	1.348	29	18	$(^2F^\circ)(^3P)\ ^4G^\circ$	60	*H*
$4f(^2F^\circ)6s^2$	$^2F^\circ$	$2^1/_2$	9778.986		73	13	$4f(^2F^\circ)5d^2(^1S)\ ^2F^\circ$	76	*R*
$4f(^2F^\circ)5d^2(^3P)$	$^4G^\circ$	$5^1/_2$	10035.711		93	2	$4f5d(^3H^\circ)6s\ ^2H^\circ$	31	*C*
$4f(^2F^\circ)5d^2(^3F)$	$^2P^\circ$	$1^1/_2$	10088.640		23	17	$(^2F^\circ)(^3P)\ ^4D^\circ$	50	*R*
$4f5d(^1F^\circ)6s$	$^2F^\circ$	$2^1/_2$	10114.883	0.938	54	8	$4f(^2F^\circ)5d^2(^1D)\ ^2F^\circ$	70	*H*
$4f5d(^1F^\circ)6s$	$^2F^\circ$	$3^1/_2$	10274.971	1.195	52	22	$(^3D^\circ)\ ^4D^\circ$	61	*H*
$4f(^2F^\circ)5d^2(^3P)$	$^4D^\circ$	$1^1/_2$	10454.272		31	19	$(^2F^\circ)(^3P)\ ^4F^\circ$	42	*R*
$4f5d(^3P^\circ)6s$	$^4P^\circ$	$2^1/_2$	10641.442	1.526	86	3	$4f(^2F^\circ)5d^2(^3P)\ ^4D^\circ$	62	*H*
$4f(^2F^\circ)5d^2(^3P)$	$^4D^\circ$	$^1/_2$	10684.441		36	29	$(^2F^\circ)(^3F)\ ^2P^\circ$	22	*C*
$4f(^2F^\circ)5d^2(^3P)$	$^4D^\circ$	$2^1/_2$	10798.555	0.971	37	27	$(^2F^\circ)(^3P)\ ^4F^\circ$	54	*H*
$4f(^2F^\circ)5d^2(^1G)$	$^2H^\circ$	$4^1/_2$	10924.876		44	22	$(^2F^\circ)(^1G)\ ^2G^\circ$	42	*R*
$4f(^2F^\circ)5d^2(^3P)$	$^4F^\circ$	$1^1/_2$	11007.799		58	12	$(^2F^\circ)(^3P)\ ^4D^\circ$	40	*G*
$4f(^2F^\circ)5d^2(^3P)$	$^4F^\circ$	$2^1/_2$	11325.781		55	19	$(^2F^\circ)(^3P)\ ^4D^\circ$	54	*R*
$4f(^2F^\circ)5d^2(^3P)$	$^4F^\circ$	$3^1/_2$	11340.598	1.123	38	12	$4f5d(^3G^\circ)6s\ ^2G^\circ$	63	*H*
$4f(^2F^\circ)5d^2(^3P)$	$^4D^\circ$	$3^1/_2$	11387.731		60	17	$(^2F^\circ)(^3F)\ ^4D^\circ$	46	*R*
$4f(^2F^\circ)5d^2(^1G)$	$^2H^\circ$	$5^1/_2$	11742.245	1.081	51	20	$4f5d(^1H^\circ)6s\ ^2H^\circ$	32	*H*
$4f5d(^3G^\circ)6s$	$^2G^\circ$	$3^1/_2$	11949.189	1.029	22	19	$4f(^2F^\circ)5d^2(^1D)\ ^2G^\circ$	67	*H*

TABLE 2. *Odd energy levels of* Ce II—continued

First component							Second component		
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$4f(^2F^\circ)5d^2(^3F)$	$^2D^\circ$	$2^1/_2$	12057.107		47	17	$(^2F^\circ)(^1G)\ ^2F^\circ$	48	*R*
$4f(^2F^\circ)6s^2$	$^2F^\circ$	$3^1/_2$	12260.088	1.168	42	35	$4f(^2F^\circ)5d^2(^3P)\ ^4F^\circ$	55	*H*
$4f(^2F^\circ)5d^2(^1G)$	$^2K^\circ$	$6^1/_2$	12326.417		97	2	$(^2F^\circ)(^3F)\ ^2I^\circ$	11	*B*
$4f(^2F^\circ)5d^2(^3F)$	$^2H^\circ$	$4^1/_2$	12365.806	0.921	46	23	$4f5d(^1H^\circ)6s\ ^2H^\circ$	47	*H*
$4f(^2F^\circ)5d^2(^3F)$	$^2D^\circ$	$1^1/_2$	12466.430		59	18	$(^2F^\circ)(^3P)\ ^2D^\circ$	35	*C*
$4f(^2F^\circ)5d^2(^3F)$	$^2H^\circ$	$5^1/_2$	12751.782		33	23	$4f5d(^1H^\circ)6s\ ^2H^\circ$	28	*C*
$4f(^2F^\circ)5d^2(^3P)$	$^4F^\circ$	$4^1/_2$	12762.641	1.275	65	9	$4f5d(^3G^\circ)6s\ ^2G^\circ$	46	*H*
$4f(^2F^\circ)5d^2(^1G)$	$^2F^\circ$	$2^1/_2$	13012.095		44	14	$(^2F^\circ)(^3F)\ ^2D^\circ$	43	*G*
$4f(^2F^\circ)5d^2(^1G)$	$^2F^\circ$	$3^1/_2$	13515.853		73	9	$(^2F^\circ)(^3F)\ ^2F^\circ$	35	*R*
$4f(^2F^\circ)5d^2(^3P)$	$^4F^\circ$	$4^1/_2$	13659.329		23	23	$4f5d(^3G^\circ)6s\ ^2G^\circ$	39	*C*
$4f5d(^3D^\circ)6s$	$^2D^\circ$	$1^1/_2$	13758.670		45	33	$4f(^2F^\circ)5d^2(^1D)\ ^2D^\circ$	37	*R*
$4f5d(^3P^\circ)6s$	$^2P^\circ$	$1^1/_2$	13784.834		37	36	$(^1P^\circ)\ ^2P^\circ$	39	*R*
$4f5d(^3P^\circ)6s$	$^2P^\circ$	$^1/_2$	14315.932		62	18	$(^1P^\circ)\ ^2P^\circ$	17	*B*
$4f(^2F^\circ)5d^2(^1G)$	$^2K^\circ$	$7^1/_2$	14404.40		99			4	*B*
$4f(^2F^\circ)5d^2(^1D)$	$^2F^\circ$	$2^1/_2$	14481.930		29	14	$(^2F^\circ)(^1G)\ ^2F^\circ$	40	*G*
$4f(^2F^\circ)5d^2(^1G)$	$^2I^\circ$	$5^1/_2$	14963.100		41	39	$(^2F^\circ)(^3F)\ ^2I^\circ$	25	*G*
$4f(^2F^\circ)5d^2(^1G)$	$^2I^\circ$	$6^1/_2$	15517.772		56	42	$(^2F^\circ)(^3F)\ ^2I^\circ$	13	*C*
$4f5d(^3D^\circ)6s$	$^2D^\circ$	$2^1/_2$	15565.420		26	20	$4f(^2F^\circ)5d^2(^1G)\ ^2D^\circ$	36	*C*
$4f(^2F^\circ)5d^2(^1D)$	$^2F^\circ$	$3^1/_2$	16159.536		42	14	$4f5d(^3F^\circ)6s\ ^2F^\circ$	37	*C*
$4f5d(^1H^\circ)6s$	$^2H^\circ$	$4^1/_2$	16192.466		62	20	$4f(^2F^\circ)5d^2(^1D)\ ^2H^\circ$	25	*C*
$4f5d(^1H^\circ)6s$	$^2H^\circ$	$5^1/_2$	17171.245		45	29	$4f(^2F^\circ)5d^2(^1D)\ ^2H^\circ$	19	*C*
$4f(^2F^\circ)5d^2(^3P)$	$^2G^\circ$	$3^1/_2$	17300.310		41	18	$(^2F^\circ)(^1D)\ ^2G^\circ$	24	*C*
$4f(^2F^\circ)5d^2(^3P)$	$^2G^\circ$	$4^1/_2$	17475.023		38	28	$(^2F^\circ)(^1D)\ ^2G^\circ$	19	*C*
$4f5d(^1P^\circ)6s$	$^2P^\circ$	$^1/_2$	17851.80		74	12	$(^1D^\circ)\ ^2P^\circ$	9	*B*
$4f(^2F^\circ)5d^2(^1G)$	$^2D^\circ$	$2^1/_2$	18147.005		55	17	$(^2F^\circ)(^1D)\ ^2D^\circ$	19	*B*
$4f(^2F^\circ)5d^2(^3P)$	$^2F^\circ$	$2^1/_2$	19136.024		54	15	$(^2F^\circ)(^1S)\ ^2F^\circ$	21	*C*
$4f5d(^1P^\circ)6s$	$^2P^\circ$	$1^1/_2$	19138.534		42	21	$(^1G^\circ)\ ^2P^\circ$	12	*C*
$4f(^2F^\circ)5d^2(^3P)$	$^2F^\circ$	$3^1/_2$	19920.813		62	11	$(^2F^\circ)(^3F)\ ^2F^\circ$	15	*C*
$4f(^2F^\circ)5d^2(^1G)$	$^2P^\circ$	$1^1/_2$	19946.568		59	13	$4f5d(^1P^\circ)6s\ ^2P^\circ$	13	*C*
$4f^2(^3H_4)6p_{1/2}$	$(4,^1/_2)$	$4^1/_2$	25766.355	0.799	95	4	$(^1G_4)6p_{1/2}$	20	*H*
$4f^2(^3H_4)6p_{1/2}$	$(4,^1/_2)$	$3^1/_2$	26268.203	0.712	75	19	$(^3H_4)6p_{11/2}$	19	*H*
$4f^2(^3H_5)6p_{1/2}$	$(5,^1/_2)$	$5^1/_2$	27378.515	1.005	87	11	$(^3H_4)6p_{11/2}$	21	*H*
$4f^2(^3H_4)6p_{11/2}$	$(4,1^1/_2)$	$4^1/_2$	27432.782	0.941	62	31	$(^3H_5)6p_{1/2}$	21	*H*
$4f^2(^3H_5)6p_{1/2}$	$(5,^1/_2)$	$4^1/_2$	27975.619	0.933	51	34	$(^3H_4)6p_{11/2}$	28	*H*
$4f^2(^3H_4)6p_{11/2}$	$(4,1^1/_2)$	$5^1/_2$	28327.071	1.036	64	26	$(^3H_5)6p_{11/2}$	21	*H*
$4f^2(^3H_4)6p_{11/2}$	$(4,1^1/_2)$	$3^1/_2$	28349.582	0.900	71	15	$(^3H_4)6p_{1/2}$	23	*H*
$4f^2(^3H_4)6p_{11/2}$	$(4,1^1/_2)$	$2^1/_2$	28396.150	0.594	65	27	$(^3F_2)6p_{1/2}$	17	*H*
$4f^2(^3H_6)6p_{1/2}$	$(6,^1/_2)$	$6^1/_2$	29043.854	1.130	70	27	$(^3H_5)6p_{11/2}$	17	*H*

TABLE 2 *Odd energy levels of* Ce II—Continued

First component						Second component			
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$4f^2(^3H_6)6p_{1/2}$	$(6,1/2)$	$5^1/_2$	29263.338	1.107	62	14	$(^3H_5)6p_{1^1/_2}$	24	*H*
$4f^2(^3H_5)6p_{1^1/_2}$	$(5,1^1/_2)$	$6^1/_2$	29591.873	1.158	64	19	$(^3H_6)6p_{1^1/_2}$	15	*H*
$4f^2(^3H_5)6p_{1^1/_2}$	$(5,1^1/_2)$	$4^1/_2$	29735.413	1.112	78	11	$(^3H_5)6p_{1/2}$	24	*H*
$4f^2(^3H_5)6p_{1^1/_2}$	$(5,1^1/_2)$	$5^1/_2$	29750.547	1.019	58	22	$(^3H_6)6p_{1/2}$	21	*H*
$4f^2(^3H_5)6p_{1^1/_2}$	$(5,1^1/_2)$	$3^1/_2$	29892.677	0.940	46	45	$(^3F_3)6p_{1/2}$	27	*H*
$4f^2(^3F_2)6p_{1/2}$	$(2,1/2)$	$2^1/_2$	29948.914	0.612	65	29	$(^3H_4)6p_{1^1/_2}$	17	*H*
$4f^2(^3F_2)6p_{1/2}$	$(2,1/2)$	$1^1/_2$	30120.406	0.677	95	2	$(^1D_2)6p_{1/2}$	14	*H*
$4f^2(^3F_4)6p_{1/2}$	$(4,1/2)$	$4^1/_2$	30669.702	1.110	53	27	$(^1G_4)6p_{1/2}$	30	*H*
$4f^2(^3H_6)6p_{1^1/_2}$	$(6,1^1/_2)$	$7^1/_2$	30846.582	1.205	100			7	*H*
$4f^2(^3F_3)6p_{1/2}$	$(3,1/2)$	$2^1/_2$	31024.076		95	1	$(^3F_3)6p_{1^1/_2}$	25	*G*
$4f^2(^3H_5)6p_{1^1/_2}$	$(5,1^1/_2)$	$3^1/_2$	31130.983	0.975	37	33	$(^3F_3)6p_{1/2}$	20	*H*
$4f^2(^3H_6)6p_{1^1/_2}$	$(6,1^1/_2)$	$5^1/_2$	31151.534	1.210	74	13	$(^3F_4)6p_{1^1/_2}$	21	*H*
$4f^2(^3H_6)6p_{1^1/_2}$	$(6,1^1/_2)$	$6^1/_2$	31340.393	1.110	77	12	$(^3H_6)6p_{1/2}$	18	*H*
$4f^2(^3F_4)6p_{1/2}$	$(4,1/2)$	$3^1/_2$	31344.828		52	34	$(^1G_4)6p_{1/2}$	25	*G*
$4f^2(^3F_2)6p_{1^1/_2}$	$(2,1^1/_2)$	$^1/_2$	31613.833		95	2	$(^1D_2)6p_{1^1/_2}$	6	*C*
$4f^2(^3F_2)6p_{1^1/_2}$	$(2,1^1/_2)$	$1^1/_2$	31747.243	0.860	95	2	$(^1D_2)6p_{1^1/_2}$	15	*H*
$4f^2(^3F_2)6p_{1^1/_2}$	$(2,1^1/_2)$	$2^1/_2$	31966.748	1.015	87	8	$(^3F_3)6p_{1^1/_2}$	21	*H*
$4f^2(^3F_2)6p_{1^1/_2}$	$(2,1^1/_2)$	$3^1/_2$	32235.239	1.111	52	15	$(^3F_3)6p_{1/2}$	29	*H*
$4f^2(^3H_6)6p_{1^1/_2}$	$(6,1^1/_2)$	$4^1/_2$	32372.621	1.104	48	33	$(^3F_3)6p_{1^1/_2}$	27	*H*
$4f^2(^3F_3)6p_{1^1/_2}$	$(3,1^1/_2)$	$4^1/_2$	32616.019		47	28	$(^1G_4)6p_{1/2}$	24	*C*
$4f^2(^3F_3)6p_{1^1/_2}$	$(3,1^1/_2)$	$1^1/_2$	32826.668		95	1	$4f5d(^3D^\circ)6s\ ^2D^\circ$	12	*C*
$4f^2(^3F_4)6p_{1^1/_2}$	$(4,1^1/_2)$	$5^1/_2$	32864.278		52	29	$(^1G_4)6p_{1^1/_2}$	21	*C*
$4f^2(^3F_3)6p_{1^1/_2}$	$(3,1^1/_2)$	$2^1/_2$	32885.367	1.102	47	28	$(^3F_4)6p_{1^1/_2}$	21	*H*
$4f^2(^3F_3)6p_{1^1/_2}$	$(3,1^1/_2)$	$3^1/_2$	32989.218	1.10	46	22	$(^1G_4)6p_{1/2}$	31	*H*
$4f^2(^3F_4)6p_{1^1/_2}$	$(4,1^1/_2)$	$4^1/_2$	33040.353	1.106	36	34	$(^1G_4)6p_{1^1/_2}$	24	*H*
$4f^2(^3F_4)6p_{1^1/_2}$	$(4,1^1/_2)$	$3^1/_2$	33111.163	1.086	29	27	$(^3F_3)6p_{1^1/_2}$	21	*H*
$4f^2(^1G_4)6p_{1/2}$	$(4,1/2)$	$3^1/_2$	33535.636	0.966	31	23	$(^3F_4)6p_{1/2}$	27	*H*
$4f^2(^3F_3)6p_{1^1/_2}$	$(3,1^1/_2)$	$2^1/_2$	33594.152		41	34	$(^3F_4)6p_{1^1/_2}$	22	*C*
$4f^2(^3F_4)6p_{1/2}$	$(4,1/2)$	$4^1/_2$	33908.193	1.11	30	21	$(^1G_4)6p_{1^1/_2}$	28	*H*
$4f^2(^1G_4)6p_{1^1/_2}$	$(4,1^1/_2)$	$5^1/_2$	34861.526		63	34	$(^3F_4)6p_{1^1/_2}$	22	*C*
$4f^2(^3F_4)6p_{1^1/_2}$	$(4,1^1/_2)$	$4^1/_2$	35026.944	1.142	50	41	$(^1G_4)6p_{1^1/_2}$	19	*H*
$4f^2(^1G_4)6p_{1^1/_2}$	$(4,1^1/_2)$	$2^1/_2$	35298.190		59	32	$(^3F_4)6p_{1^1/_2}$	14	*C*
$4f^2(^3F_4)6p_{1^1/_2}$	$(4,1^1/_2)$	$3^1/_2$	35625.700	0.923	48	46	$(^1G_4)6p_{1^1/_2}$	20	*H*
$4f^3$	$^4I^\circ$	$4^1/_2$	38194.728	0.720	97	2	$^2H^\circ 2$	16	*H*
$4f^2(^1D_2)6p_{1/2}$	$(2,1/2)$	$1^1/_2$	38661.520		82	7	$(^3P_2)6p_{1/2}$	10	*B*
$4f^2(^1D_2)6p_{1/2}$	$(2,1/2)$	$2^1/_2$	38835.734		83	7	$(^3P_2)6p_{1/2}$	19	*B*
$4f^3$	$^4I^\circ$	$5^1/_2$	39079.298	0.964	99	1	$^2H^\circ 2$	12	*H*
$4f^3$	$^4I^\circ$	$6^1/_2$	40039.524	1.104	99			12	*H*

TABLE 2. *Odd energy levels of* Ce II—Continued

First component							Second component		
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$4f^2(^1D_2)6p_{1\frac{1}{2}}$	$(2,1\frac{1}{2})$	$3\frac{1}{2}$	40475.925		88	7	$(^3P_2)6p_{1\frac{1}{2}}$	21	*B*
$4f^2(^1D_2)6p_{1\frac{1}{2}}$	$(2,1\frac{1}{2})$	$1\frac{1}{2}$	40720.122		79	7	$(^3P_2)6p_{1\frac{1}{2}}$	13	*B*
$4f^3$	$^4I°$	$7\frac{1}{2}$	41058.614	1.197	99	1	$^2K°$	9	*H*
$4f^2(^1D_2)6p_{1\frac{1}{2}}$	$(2,1\frac{1}{2})$	$2\frac{1}{2}$	41100.932		89	5	$(^3P_2)6p_{1\frac{1}{2}}$	20	*B*
$4f^2(^3P_1)6p_{\frac{1}{2}}$	$(1,\frac{1}{2})$	$1\frac{1}{2}$	42533.459		42	22	$(^3P_2)6p_{\frac{1}{2}}$	6	*B*
$4f^2(^1I_6)6p_{\frac{1}{2}}$	$(6,\frac{1}{2})$	$6\frac{1}{2}$	42712.810		79	21	$(^1I_6)6p_{1\frac{1}{2}}$	13	*B*
$4f^2(^1I_6)6p_{\frac{1}{2}}$	$(6,\frac{1}{2})$	$5\frac{1}{2}$	42729.447		69	30	$(^1I_6)6p_{1\frac{1}{2}}$	18	*G*
$4f^2(^3P_0)6p_{1\frac{1}{2}}$	$(0,1\frac{1}{2})$	$1\frac{1}{2}$	44423.575		69	24	$(^3P_2)6p_{\frac{1}{2}}$	13	*B*
$4f^2(^1I_6)6p_{1\frac{1}{2}}$	$(6,1\frac{1}{2})$	$6\frac{1}{2}$	44637.548		79	20	$(^1I_6)6p_{\frac{1}{2}}$	10	*B*
$4f^3$	$^4F°$	$1\frac{1}{2}$	44651.303		62	25	$4f^2(^3P_1)6p_{1\frac{1}{2}}$	13	*C*
$4f^2(^3P_2)6p_{1\frac{1}{2}}$	$(2,1\frac{1}{2})$	$3\frac{1}{2}$	44893.939		92	7	$(^1D_2)6p_{1\frac{1}{2}}$	12	*B*
$4f^3$	$^2H°2$	$4\frac{1}{2}$	44949.011		61	9	$^2H°1$	20	*G*
$4f^3$	$^4F°$	$2\frac{1}{2}$	45130.529		97	2	$^2D°1$	19	*C*
$4f^2(^1I_6)6p_{1\frac{1}{2}}$	$(6,1\frac{1}{2})$	$7\frac{1}{2}$	45443.86		99			5	*B*
$4f^3$	$^4F°$	$3\frac{1}{2}$	45598.301		92	4	$^2G°1$	19	*G*
$4f^2(^1I_6)6p_{1\frac{1}{2}}$	$(6,1\frac{1}{2})$	$5\frac{1}{2}$	45864.950		59	24	$(^1I_6)6p_{\frac{1}{2}}$	12	*B*
$4f^3$	$^4F°$	$4\frac{1}{2}$	46162.692		77	9	$^2H°2$	20	*G*
$4f^3$	$^2H°2$	$5\frac{1}{2}$	46588.131		66	10	$4f^2(^1I_6)6p_{1\frac{1}{2}}$	19	*G*
$4f^2(^1I_6)6p_{1\frac{1}{2}}$	$(6,1\frac{1}{2})$	$4\frac{1}{2}$	46697.084		89	4	$4f^3\ ^2H°2$	13	*B*
$4f^3$	$^2G°1$	$3\frac{1}{2}$	47430.184		35	31	$^4G°$	22	*C*
$4f^3$	$^4G°$	$2\frac{1}{2}$	47459.894		98	1	$4f(^2F°)5d\,^2(^3P)\ ^4G°$	17	*C*
$4f^3$	$^2K°$	$6\frac{1}{2}$	48045.10		98	1	$^2I°$	7	*B*
$4f^3$	$^4G°$	$3\frac{1}{2}$	48330.79		67	18	$^2G°1$	25	*C*
$4f^3$	$^4G°$	$4\frac{1}{2}$	48549.99		65	11	$^2G°1$	18	*G*
$4f^3$	$^2K°$	$7\frac{1}{2}$	49087.88		94	4	$^2L°$	7	*B*
$4f^3$	$^2G°1$	$4\frac{1}{2}$	49267.982		33	31	$^4G°$	18	*C*
$4f^3$	$^4G°$	$5\frac{1}{2}$	49617.70		93	4	$^2H°1$	16	*G*

TABLE 3. *Even energy levels of* Ce II

First component							Second component		
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$4f^2(^3H)6s$	^4H	$3\frac{1}{2}$	3854.012	0.669	95	3	$(^1G)\ ^2G$	11	*H*
$4f^2(^3H)6s$	^4H	$4\frac{1}{2}$	4165.550	0.949	55	40	$(^3H)\ ^2H$	24	*H*
$4f^2(^3H)6s$	^4H	$5\frac{1}{2}$	5513.709	1.125	82	17	$(^3H)\ ^2H$	21	*H*
$4f^2(^3H)6s$	^2H	$4\frac{1}{2}$	5616.739	0.934	56	42	$(^3H)\ ^4H$	22	*H*
$4f^2(^3H)6s$	^4H	$6\frac{1}{2}$	6967.547	1.225	98	1	$4f5d(^3G°)6p\ ^4H$	12	*H*
$4f^2(^3H)5d$	^2H	$4\frac{1}{2}$	7011.804	0.889	65	19	$(^3H)\ ^4I$	22	*H*
$4f^2(^3H)5d$	^4K	$5\frac{1}{2}$	7092.265	0.803	83	7	$(^3H)\ ^2I$	18	*H*

TABLE 3. *Even energy levels of* Ce II—Continued

First component						Second component			
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$4f^2(^3H)6s$	^2H	$5^1/_2$	7341.007	1.089	81	17	$(^3H)\ ^4H$	20	*H*
$4f^2(^3F)6s$	^4F	$1^1/_2$	7454.951	0.407	95	2	$(^1D)\ ^2D$	10	*H*
$4f^2(^3F)6s$	^4F	$2^1/_2$	7722.285	0.986	68	27	$(^3F)\ ^2F$	18	*H*
$4f^2(^3H)5d$	^4I	$4^1/_2$	8131.217	0.751	78	11	$(^3H)\ ^2H$	19	*H*
$4f^2(^3H)5d$	^2H	$5^1/_2$	8278.054	0.957	56	14	$(^3F)\ ^2H$	20	*H*
$4f^2(^3H)5d$	^4K	$6^1/_2$	8423.672	0.980	96	2	$(^3H)\ ^2I$	8	*H*
$4f^2(^3H)5d$	^4G	$2^1/_2$	8448.641	0.633	49	30	$(^3F)\ ^4G$	12	*H*
$4f^2(^3F)6s$	^4F	$3^1/_2$	8531.678	1.213	89	4	$(^3F)\ ^2F$	21	*H*
$4f^2(^3F)6s$	^4F	$4^1/_2$	8774.064	1.247	61	34	$(^1G)\ ^2G$	19	*H*
$4f^2(^3F)6s$	^2F	$2^1/_2$	8789.380	0.905	69	28	$(^3F)\ ^4F$	20	*H*
$4f^2(^3H)5d$	^4I	$5^1/_2$	8896.729	0.961	92	4	$(^3H)\ ^2I$	16	*H*
$4f^2(^3F)6s$	^2F	$3^1/_2$	9053.629	1.026	54	41	$(^1G)\ ^2G$	25	*H*
$4f^2(^3H)5d$	^4G	$3^1/_2$	9316.912	0.992	54	32	$(^3F)\ ^4G$	22	*H*
$4f^2(^3H)5d$	^4H	$3^1/_2$	9725.733	0.694	63	25	$(^3F)\ ^4H$	19	*H*
$4f^2(^3H)5d$	^4K	$7^1/_2$	9771.956	1.090	100			6	*H*
$4f^2(^3H)5d$	^4I	$6^1/_2$	10058.226	1.105	97	2	$(^3H)\ ^2I$	15	*H*
$4f^2(^3H)5d$	^4G	$4^1/_2$	10314.162	1.04	55	34	$(^3F)\ ^4G$	24	*H*
$4f^2(^3H)5d$	^2I	$5^1/_2$	10646.070	0.951	46	22	$(^1G)\ ^2I$	22	*H*
$4f^2(^3H)5d$	^4H	$4^1/_2$	10703.305	0.969	62	27	$(^3F)\ ^4H$	19	*H*
$4f^2(^3H)5d$	^2F	$2^1/_2$	10820.486		34	26	$(^3F)\ ^2F$	19	*C*
$4f^2(^1G)6s$	^2G	$4^1/_2$	10869.541	1.193	60	36	$(^3F)\ ^4F$	18	*H*
$4f^2(^1G)6s$	^2G	$3^1/_2$	11015.579	1.016	49	39	$(^3F)\ ^2F$	18	*H*
$4f^2(^3H)5d$	^4K	$8^1/_2$	11165.796	1.187	100			3	*H*
$4f^2(^3H)5d$	^4I	$7^1/_2$	11309.972	1.193	98	1	$(^3H)\ ^2K$	6	*H*
$4f^2(^3H)5d$	^2I	$6^1/_2$	11454.701	1.101	48	27	$(^1G)\ ^2I$	18	*H*
$4f^2(^3H)5d$	^4G	$5^1/_2$	11458.353	1.235	48	35	$(^3F)\ ^4G$	17	*H*
$4f^2(^3H)5d$	^4H	$5^1/_2$	11759.467	1.124	64	28	$(^3F)\ ^4H$	22	*H*
$4f^2(^3F)5d$	^2F	$3^1/_2$	12097.276		38	32	$(^3H)\ ^2F$	26	*C*
$4f^2(^3F)5d$	^4H	$3^1/_2$	12456.746	0.691	63	28	$(^3H)\ ^4H$	20	*H*
$4f^2(^3H)5d$	^4F	$1^1/_2$	12704.634	0.467	68	17	$(^3F)\ ^4F$	9	*H*
$4f^2(^3H)5d$	^4H	$6^1/_2$	13027.758	1.210	59	22	$(^3F)\ ^4H$	12	*H*
$4f^2(^3F)5d$	^4H	$4^1/_2$	13117.922		36	21	$(^1G)\ ^2H$	29	*G*
$4f^2(^3H)5d$	^2G	$3^1/_2$	13217.976		45	11	$(^1G)\ ^2F$	23	*G*
$4f^2(^3F)5d$	^4P	$1^1/_2$	13256.701		60	16	$(^3F)\ ^2D$	11	*C*
$4f^2(^3H)5d$	^4F	$2^1/_2$	13268.218		51	12	$(^3F)\ ^4F$	17	*C*
$4f^2(^3F)5d$	^4P	$2^1/_2$	13436.858		47	13	$(^3F)\ ^2D$	17	*C*
$4f^2(^3F)5d$	^4P	$^1/_2$	13503.508		64	16	$(^3F)\ ^2P$	8	*B*
$4f^2(^3F)5d$	^4H	$4^1/_2$	13527.239	0.963	32	24	$(^1G)\ ^2H$	31	*H*

TABLE 3. *Even energy levels of* Ce II—Continued

First component								
Configuration	Term	J	Level	g	%	Second component		n, ref.
			cm^{-1}					
$4f^2(^3F)5d$	^4G	$2^1/_2$	13675.722		54	25	$(^3H)\ ^4G$	20 *G*
$4f^2(^3F)5d$	^2D	$1^1/_2$	14049.761		34	14	$(^3F)\ ^2P$	11 *C*
$4f^2(^3H)5d$	^4F	$3^1/_2$	14097.689		40	17	$(^3F)\ ^4G$	17 *C*
$4f^2(^3F)5d$	^4G	$3^1/_2$	14252.178		30	20	$(^3H)\ ^4G$	24 *G*
$4f^2(^3F)5d$	^4H	$5^1/_2$	14276.298	1.114	59	27	$(^3H)\ ^4H$	30 *H*
$4f^2(^3H)5d$	^4F	$4^1/_2$	14387.112		33	16	$(^3H)\ ^2G$	27 *G*
$4f^2(^1G)5d$	^2H	$5^1/_2$	14625.503		44	16	$(^3H)\ ^4G$	22 *G*
$4f^2(^3F)5d$	^4D	$1^1/_2$	14727.540		35	27	$(^3F)\ ^2P$	14 *C*
$4f^2(^3F)5d$	^4F	$2^1/_2$	14739.761		24	19	$(^3H)\ ^2F$	20 *C*
$4f^2(^1G)5d$	^2G	$3^1/_2$	14827.623		27	12	$(^3H)\ ^2G$	27 *C*
$4f^2(^3F)5d$	^4G	$4^1/_2$	15134.048		41	18	$(^3H)\ ^4G$	30 *G*
$4f^2(^3F)5d$	^4F	$1^1/_2$	15235.579		49	19	$(^3H)\ ^4F$	15 *C*
$4f^2(^3F)5d$	^4H	$6^1/_2$	15281.602	1.204	61	27	$(^3H)\ ^4H$	20 *H*
$4f^2(^3F)5d$	^4F	$2^1/_2$	15434.699		29	22	$(^3F)\ ^2D$	16 *B*
$4f^2(^3F)5d$	^4D	$^1/_2$	15510.786		74	21	$(^3F)\ ^2P$	5 *B*
$4f^2(^3F)5d$	^4D	$2^1/_2$	15529.576		80	5	$(^1G)\ ^2D$	21 *C*
$4f^2(^3F)5d$	^4D	$1^1/_2$	15576.568		50	28	$(^3F)\ ^2P$	15 *C*
$4f^2(^3H)5d$	^2K	$6^1/_2$	15593.660		76	15	$(^1I)\ ^2K$	16 *G*
$4f^2(^3H)5d$	^2G	$4^1/_2$	15803.310		38	12	$(^3F)\ ^4G$	24 *B*
$4f^2(^3F)5d$	^4D	$3^1/_2$	15822.059		28	16	$(^1G)\ ^2G$	29 *G*
$4f^2(^3H)5d$	^4F	$4^1/_2$	15859.363		43	35	$(^1G)\ ^2G$	26 *G*
$4f^2(^1D)6s$	^2D	$2^1/_2$	16133.194		68	5	$(^3P)\ ^4P$	18 *C*
$4f^2(^3F)5d$	^4D	$3^1/_2$	16152.377		48	27	$(^3F)\ ^4F$	30 *G*
$4f^2(^1D)6s$	^2D	$1^1/_2$	16268.673		86	4	$(^3P)\ ^2P$	10 *B*
$4f^2(^1D)6s$	^2D	$2^1/_2$	16454.555		17	12	$4f^2(^3H)5d\ ^4F$	16 *C*
$4f^2(^3F)5d$	^4G	$5^1/_2$	16545.269		47	23	$(^3H)\ ^4G$	17 *C*
$4f^2(^3F)5d$	^4F	$3^1/_2$	17000.007		28	20	$(^3H)\ ^4F$	23 *C*
$4f^2(^3H)5d$	^2K	$7^1/_2$	17232.652		80	18	$(^1I)\ ^2K$	9 *C*
$4f^2(^3F)5d$	^4F	$4^1/_2$	17571.401		55	17	$(^1G)\ ^2G$	22 *C*
$4f^2(^1G)5d$	^2D	$2^1/_2$	17976.413		56	27	$(^3F)\ ^2D$	13 *C*
$4f^2(^3F)5d$	^2G	$3^1/_2$	18393.327		36	18	$(^1D)\ ^2G$	31 *C*
$4f^2(^1G)5d$	^2I	$5^1/_2$	18704.313		56	23	$(^3H)\ ^2I$	15 *C*
$4f^2(^3F)5d$	^2H	$4^1/_2$	19481.040		47	13	$(^1G)\ ^2H$	23 *C*
$4f^2(^1G)5d$	^2F	$2^1/_2$	19483.225		50	27	$(^3F)\ ^2F$	25 *C*
$4f^2(^1G)5d$	^2I	$6^1/_2$	19950.340		62	26	$(^3H)\ ^2I$	13 *C*
$4f^2(^3F)5d$	^2G	$4^1/_2$	19982.187		42	17	$(^1D)\ ^2G$	29 *C*
$4f^2(^3F)5d$	^2H	$5^1/_2$	20554.596		51	11	$(^1I)\ ^2H$	14 *C*
$4f^2(^3P)6s$	^4P	$2^1/_2$	20714.959		87	6	$(^1D)\ ^2D$	7 *B*
$4f^2(^1I)6s$	^2I	$5^1/_2$	20783.79		96	3	$4f5d(^1H^\circ)6p\ ^2I$	11 *B*

TABLE 3. *Even energy levels of* Ce II—Continued

First component									
Configuration	Term	J	Level	g	%		Second component	n, ref.	
			cm^{-1}						
$4f^2(^1I)6s$	^2I	$6^1/_2$	20881.327		97	3	$4f5d(^1H^\circ)6p$ ^2I	5	*B*
$4f^2(^1G)5d$	^2F	$3^1/_2$	20940.839		33	26	(^3F) ^2F	27	*C*
$4f^2(^3P)6s$	^2P	$1^1/_2$	21373.623		66	12	$4f^2(^1D)6d$ ^2P	9	*B*
$4f^2(^3P)5d$	^4F	$1^1/_2$	22290.320		30	17	(^1D) ^2D	7	*C*
$4f^2(^3P)5d$	^4F	$2^1/_2$	22576.170		32	19	(^1D) ^2F	16	*C*
$4f^2(^3P)5d$	^4F	$1^1/_2$	22903.974		34	21	(^3P) ^4P	14	*C*
$4f^2(^3P)5d$	^4P	$2^1/_2$	23200.331		45	15	(^3P) ^4F	15	*C*
$4f^2(^3P)5d$	^4F	$3^1/_2$	23267.351		41	16	(^1D) ^2G	24	*C*
$4f^2(^1D)5d$	^2D	$1^1/_2$	23508.880		34	29	(^3P) ^4P	11	*C*
$4f^2(^3P)5d$	^4F	$4^1/_2$	23640.563		33	29	(^1D) ^2G	23	*C*
$4f^2(^1D)5d$	^2F	$2^1/_2$	23782.988		40	28	(^3P) ^4F	19	*C*
$4f^2(^1D)5d$	^2G	$3^1/_2$	24153.466		34	18	(^3P) ^4F	27	*C*
$4f^2(^1D)5d$	^2D	$2^1/_2$	24500.756		43	21	(^3P) ^4P	20	*C*
$4f5d(^1G^\circ)6p$	^2H	$4^1/_2$	24663.053	0.933	34	25	(^3H) ^2H	25	*A*
$4f^2(^1D)5d$	^2F	$3^1/_2$	24819.334		43	18	(^3P) ^4F	27	*C*
$4f^2(^3P)5d$	^2P	$1^1/_2$	25099.482		43	13	(^3P) ^4P	9	*C*
$4f5d(^3F^\circ)6p$	^4G	$2^1/_2$	25359.686	0.761	42	23	(^1D) ^2F	17	*A*
$4f^2(^3P)5d$	^4F	$4^1/_2$	25361.674		45	28	(^1D) ^2G	26	*C*
$4f^2(^1I)5d$	^2I	$5^1/_2$	25492.251		92	3	(^3H) ^2I	16	*B*
$4f5d(^3F^\circ)6p$	^4F	$1^1/_2$	25681.488	0.692	32	27	$(^3F^\circ)$ ^2D	17	*A*
$4f^2(^1I)5d$	^2I	$6^1/_2$	25753.492		84	8	(^1I) ^2K	13	*B*
$4f5d(^1G^\circ)6p$	^2G	$3^1/_2$	25945.396	0.941	44	17	$(^3H^\circ)$ ^4H	40	*A*
$4f^2(^3P)5d$	^4D	$^1/_2$	26351.911		86	7	(^3P) ^2P	8	*B*
$4f^2(^3P)5d$	^4D	$1^1/_2$	26479.921		86	4	(^3P) ^2P	11	*C*
$4f^2(^3P)5d$	^4D	$2^1/_2$	26817.940		88	2	$4f5d(^3P^\circ)6p$ ^4D	14	*C*
$4f5d(^3H^\circ)6p$	^4I	$4^1/_2$	26841.384	0.954	42	28	$(^1G^\circ)$ ^2G	35	*A*
$4f5d(^3H^\circ)6p$	^4H	$3^1/_2$	26900.354	0.841	23	18	$(^3F^\circ)$ ^2G	30	*A*
$4f5d(^3F^\circ)6p$	^4G	$3^1/_2$	27187.047	1.015	51	11	$(^1D^\circ)$ ^2F	33	*A*
$4f5d(^3F^\circ)6p$	^4F	$2^1/_2$	27249.669	1.061	55	13	$(^3F^\circ)$ ^2D	32	*A*
$4f^2(^1I)5d$	^2L	$7^1/_2$	27353.67		98	1	$(^3H^\circ)$ ^2K	6	*B*
$4f5d(^1G^\circ)6p$	^2H	$5^1/_2$	27379.949	1.052	40	33	$(^3H^\circ)$ ^4I	23	*A*
$4f^2(^3P)5d$	^4D	$3^1/_2$	27514.660		58	13	$4f5d(^3H^\circ)6p$ ^4H	33	*A*
$4f^2(^1I)5d$	^2K	$6^1/_2$	27706.631		75	15	(^3H) ^2K	11	*B*
$4f^2(^3P)5d$	^4D	$3^1/_2$	27811.496		26	24	$4f5d(^3H^\circ)6p$ ^4H	34	*A*
$4f5d(^3F^\circ)6p$	^4G	$2^1/_2$	27812.398		40	17	$(^3G^\circ)$ ^2F	30	*A*
$4f5d(^3F^\circ)6p$	^4F	$1^1/_2$	27835.233	0.833	32	26	$(^1D^\circ)$ ^2P	24	*A*
$4f^2(^1I)5d$	^2H	$4^1/_2$	27905.157	0.920	77	7	(^3F) ^2H	32	*H*
$4f5d(^3H^\circ)6p$	^4H	$4^1/_2$	27934.638	0.969	35	27	$(^1G^\circ)$ ^2H	33	*A*

TABLE 3. *Even energy levels of* Ce II—Continued

First component								
Configuration	Term	J	Level	g	%	Second component		n, ref.
			cm^{-1}					
$4f^2(^1I)5d$	^2H	$5^1/_2$	27950.889		81	8	$(^3F)\ ^2H$	25 *C*
$4f^2(^1I)5d$	^2L	$8^1/_2$	28096.58		100			3 *B*
$4f^2(^1I)5d$	^2K	$7^1/_2$	28117.519		81	17	$(^3H)\ ^2K$	6 *B*
$4f5d(^3G^\circ)6p$	^4H	$3^1/_2$	28297.473	0.906	46	13	$(^3G^\circ)\ ^2G$	45 *A*
$4f5d(^3H^\circ)6p$	^2H	$4^1/_2$	28334.756	0.891	38	31	$(^3H^\circ)\ ^4I$	33 *A*
$4f5d(^3G^\circ)6p$	^4G	$2^1/_2$	28337.814	0.916	26	16	$(^3G^\circ)\ ^2F$	38 *A*
$4f5d(^1D^\circ)6p$	^2P	$^1/_2$	28345.313	0.387	44	43	$(^3F^\circ)\ ^4D$	14 *H*
$4f5d(^1G^\circ)6p$	^2H	$5^1/_2$	28634.516	1.080	37	27	$(^3H^\circ)\ ^4I$	27 *A*
$4f5d(^1G^\circ)6p$	^2F	$2^1/_2$	28685.758	0.827	37	14	$(^3H^\circ)\ ^4G$	31 *H*
$4f5d(^3H^\circ)6p$	^4H	$4^1/_2$	28725.148	1.002	36	18	$(^1G^\circ)\ ^2H$	37 *A*
$4f5d(^3F^\circ)6p$	^4F	$3^1/_2$	28730.712	1.124	54	7	$(^3F^\circ)\ ^4G$	35 *H*
$4f5d(^3F^\circ)6p$	^2D	$1^1/_2$	29029.353	0.980	31	29	$(^1D^\circ)\ ^2P$	28 *H*
$4f5d(^3F^\circ)6p$	^4G	$4^1/_2$	29166.597	1.124	64	9	$(^3G^\circ)\ ^4G$	33 *A*
$4f5d(^3F^\circ)6p$	^2D	$2^1/_2$	29281.374	1.052	23	22	$(^3F^\circ)\ ^4D$	39 *A*
$4f^2(^3P)5d$	^2F	$3^1/_2$	29364.740	0.894	17	14	$4f5d(^3G^\circ)6p\ ^2F$	35 *H*
$4f5d(^3H^\circ)6p$	^4I	$5^1/_2$	29438.817	1.041	39	31	$(^3H^\circ)\ ^2H$	26 *A*
$4f5d(^3G^\circ)6p$	^4F	$1^1/_2$	29449.778	0.723	36	23	$(^3F^\circ)\ ^4D$	28 *H*
$4f^2(^3P)5d$	^2F	$2^1/_2$	29673.771		51	13	$5d^3\ ^2F$	24 *G*
$4f5d(^3D^\circ)6p$	^2P	$^1/_2$	29790.270	0.45	39	26	$(^3F^\circ)\ ^4D$	15 *H*
$4f5d(^3F^\circ)6p$	^2F	$3^1/_2$	29794.517	1.052	24	15	$(^3F^\circ)\ ^4D$	43 *H*
$4f^2(^3P)5d$	^2F	$3^1/_2$	29807.078	1.055	39	8	$5d^3\ ^2F$	44 *A*
$4f5d(^3G^\circ)6p$	^4H	$4^1/_2$	29908.904	1.074	44	15	$(^3G^\circ)\ ^2G$	36 *A*
$4f5d(^3F^\circ)6p$	^4D	$1^1/_2$	29984.052	0.773	38	14	$(^3G^\circ)\ ^4F$	26 *A*
$4f5d(^3G^\circ)6p$	^4G	$2^1/_2$	29994.041		34	21	$(^3G^\circ)\ ^4F$	38 *H*
$4f5d(^3F^\circ)6p$	^4D	$3^1/_2$	30065.164	1.075	29	12	$(^3H^\circ)\ ^2G$	42 *A*
$4f5d(^3H^\circ)6p$	^4H	$5^1/_2$	30134.910	1.146	53	22	$(^3H^\circ)\ ^2H$	32 *H*
$4f5d(^3G^\circ)6p$	^4G	$3^1/_2$	30166.057	1.036	30	16	$(^1D^\circ)\ ^2F$	41 *A*
$4f5d(^3H^\circ)6p$	^4I	$6^1/_2$	30180.096	1.115	91	9	$(^3H^\circ)\ ^4H$	14 *H*
$4f5d(^3F^\circ)6p$	^4F	$4^1/_2$	30245.878	1.225	41	21	$(^1G^\circ)\ ^2G$	38 *A*
$4f5d(^3H^\circ)6p$	^4G	$2^1/_2$	30425.349	0.831	37	15	$4f5s(^3F^\circ)6p\ ^4G$	43 *A*
$4f5d(^3F^\circ)6p$	^2D	$2^1/_2$	30637.157	1.125	10	10	$(^3G^\circ)\ ^2F$	42 *A*
$4f5d(^3G^\circ)6p$	^4H	$4^1/_2$	30702.610	1.079	30	15	$(^3F^\circ)\ ^2G$	39 *A*
$4f5s(^3F^\circ)6p$	^4F	$1^1/_2$	30745.286		29	28	$4f5d(^3D^\circ)6p\ ^4F$	25 *G*
$4f5d(^3G^\circ)6p$	^4G	$3^1/_2$	30829.124	1.016	25	12	$(^1D^\circ)\ ^2F$	46 *A*
$4f5d(^1D^\circ)6p$	^2D	$1^1/_2$	30961.518	1.043	25	17	$(^3F^\circ)\ ^4D$	30 *H*
$4f5d(^1D^\circ)6p$	^2P	$^1/_2$	31032.611	0.692	31	24	$(^3F^\circ)\ ^4D$	16 *H*
$4f5d(^3F^\circ)6p$	^2F	$2^1/_2$	31043.110	1.014	29	26	$(^3F^\circ)\ ^4D$	40 *H*
$4f5d(^3G^\circ)6p$	^4F	$4^1/_2$	31075.603	1.207	24	23	$(^3G^\circ)\ ^4G$	42 *A*

501-968 O - 73 - 4

TABLE 3. *Even energy levels of* Ce II—Continued

First component						Second component			
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$4f5d(^3F^\circ)6p$	^4G	$5^1/_2$	31089.731	1.221	59	12	$(^3G^\circ)$ ^4H	24	*H*
$4f5d(^3H^\circ)6p$	^4H	$6^1/_2$	31155.623	1.203	80	9	$(^3H^\circ)$ ^4I	15	*H*
$4f5d(^3D^\circ)6p$	^2P	$1^1/_2$	31170.645	1.118	31	19	$(^3D^\circ)$ ^4D	32	*H*
$4f5d(^3F^\circ)6p$	^4D	$3^1/_2$	31207.927	1.123	15	12	$(^3G^\circ)$ ^4F	43	*A*
$4f5d(^1D^\circ)6p$	^2F	$2^1/_2$	31234.878	0.975	20	16	$(^1D^\circ)$ ^2D	39	*H*
$4f5d(^3D^\circ)6p$	^4F	$2^1/_2$	31369.093		15	15	$5d^3$ ^4F	36	*G*
$4f5d(^3G^\circ)6p$	^4F	$3^1/_2$	31558.626	1.167	13	12	$(^3D^\circ)$ ^4F	47	*A*
$4f^2(^1I)5d$	^2G	$4^1/_2$	31568.019	1.138	33	17	$4f5d(^3G^\circ)6p$ ^4G	35	*H*
$4f5d(^3G^\circ)6p$	^4H	$5^1/_2$	31738.484	1.140	64	13	$(^3F^\circ)$ ^4G	22	*A*
$4f^2(^3P)5d$	^2D	$1^1/_2$	31766.109		32	11	$5d^3$ $^2D1$	31	*G*
$4f5d(^3D^\circ)6p$	^4P	$2^1/_2$	31851.397	1.238	20	18	$(^3D^\circ)$ ^4D	38	*A*
$4f5d(^3G^\circ)6p$	^4G	$4^1/_2$	31930.936	1.149	31	20	$4f^2(^1I)5d$ ^2G	35	*H*
$4f5d(^3H^\circ)6p$	^4G	$3^1/_2$	31937.653		29	23	$(^3H^\circ)$ ^2G	43	*H*
$4f6s(^3F^\circ)6p$	^4F	$2^1/_2$	32138.698	1.008	23	11	$4f5d(^3G^\circ)6p$ ^2F	37	*A*
$4f^2(^1I)5d$	^2G	$4^1/_2$	32197.982	1.195	28	16	$4f5d(^3G^\circ)6p$ ^4F	39	*H*
$4f5d(^3H^\circ)6p$	^4I	$7^1/_2$	32269.252	1.195	100			5	*H*
$4f5d(^3D^\circ)6p$	^4P	$^1/_2$	32314.466		57	20	$(^3D^\circ)$ ^4D	16	*G*
$4f5d(^3F^\circ)6p$	^2F	$3^1/_2$	32318.175	1.118	15	14	$(^3G^\circ)$ ^2G	51	*A*
$4f^2(^1I)5d$	^2G	$3^1/_2$	32413.346	1.019	68	7	$4f5d(^1H^\circ)6p$ ^2G	43	*H*
$4f5d(^3G^\circ)6p$	^4G	$5^1/_2$	32492.038	1.221	43	28	$(^3H^\circ)$ ^4G	28	*H*
$5d^3$	^4F	$1^1/_2$	32507.442	0.643	26	22	$4f^2(^3P)5d$ ^2D	26	*H*
$4f5d(^3D^\circ)6p$	^4D	$1^1/_2$	32638.165	1.070	37	12	$(^3P^\circ)$ ^4D	29	*H*
$4f^2(^3P)5d$	^2D	$2^1/_2$	32716.647	1.151	28	8	$5d^3$ ^4F	31	*H*
$4f5d(^3H^\circ)6p$	^2I	$5^1/_2$	32802.165	0.948	83	3	$(^1H^\circ)$ ^2I	28	*H*
$4f5d(^3P^\circ)6p$	^4P	$^1/_2$	32860.353		56	9	$(^3D^\circ)$ ^2P	17	*G*
$4f5d(^3F^\circ)6p$	^2G	$3^1/_2$	32862.767	1.009	21	17	$(^3G^\circ)$ ^2F	52	*A*
$4f^2(^3P)5d$	^2D	$2^1/_2$	33045.095	1.188	35	15	$4f5d(^3D^\circ)6p$ ^4P	43	*H*
$4f5d(^3D^\circ)6p$	^4P	$1^1/_2$	33050.291	1.426	48	14	$(^3D^\circ)$ ^2P	33	*H*
$5d^3$	^4F	$3^1/_2$	33079.512	1.257	24	17	$4f6s(^3F^\circ)6p$ ^4F	41	*H*
$5d^3$	^4F	$2^1/_2$	33148.589	1.098	21	16	$4f5d(^3D^\circ)6p$ ^4P	38	*H*
$4f5d(^3P^\circ)6p$	^4P	$^1/_2$	33177.196	1.484	21	18	$(^3D^\circ)$ ^4P	15	*H*
$4f5d(^1F^\circ)6p$	^2G	$4^1/_2$	33296.805		18	18	$(^3G^\circ)$ ^2G	42	*H*
$4f5d(^3D^\circ)6p$	^4D	$3^1/_2$	33409.897		15	14	$(^3G^\circ)$ ^2F	52	*H*
$4f5d(^3G^\circ)6p$	^4H	$6^1/_2$	33531.388	1.257	95	2	$(^3H^\circ)$ ^4H	12	*H*
$4f5s(^3F^\circ)6p$	^2F	$2^1/_2$	33552.582	0.920	13	11	$(^1F^\circ)$ ^2F	42	*A*
$4f6s(^3F^\circ)6p$	^4F	$1^1/_2$	33574.145	0.675	20	15	$(^3D^\circ)$ ^4F	30	*H*
$4f5d(^3H^\circ)6p$	^4G	$5^1/_2$	33659.968	1.249	41	21	$(^3G^\circ)$ ^4G	20	*H*
$4f5d(^3D^\circ)6p$	^4D	$2^1/_2$	33808.317	1.230	44	16	$(^3P^\circ)$ ^4D	44	*A*
$4f5d(^3G^\circ)6p$	^2H	$4^1/_2$	33811.567	1.090	43	16	$(^3G^\circ)$ ^2G	40	*H*
$4f5d(^3P^\circ)6p$	^4P	$1^1/_2$	33876.377	1.535	68	8	$5d^2(^3P)6s$ ^4P	34	*H*

TABLE 3. *Even energy levels of* Ce II—Continued

First component						Second component			
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$4f5d(^3D°)6p$	^4F	$3^1/_2$	33977.140	1.186	17	10	$4f6s(^1F°)6p\ ^2F$	45	*A*
$4f6s(^3F°)6p$	^4D	$^1/_2$	34006.822		39	26	$4f5d(^3P°)6p\ ^4D$	8	*B*
$4f5d(^3G°)6p$	^2H	$4^1/_2$	34044.441	1.102	22	16	$5d^3\ ^4F$	43	*H*
$5d^3$	^4F	$3^1/_2$	34155.311	1.151	19	10	$4f6s(^3F°)6p\ ^4F$	41	*A*
$4f^2(^1S)6s$	^2S	$^1/_2$	34159.877		68	12	$5d^2(^1S)6s\ ^2S$	11	*B*
$4f6s(^3F°)6p$	^4F	$1^1/_2$	34166.039		17	15	$(^3F°)\ ^4D$	36	*H*
$4f5d(^3H°)6p$	^2G	$4^1/_2$	34295.450	1.125	45	13	$(^3H°)\ ^4G$	49	*H*
$4f6s(^3F°)6p$	^4G	$2^1/_2$	34333.096	1.069	28	13	$(^1F°)\ ^2D$	43	*A*
$4f5d(^1F°)6p$	^2D	$2^1/_2$	34426.037	0.997	24	9	$4f6s(^3F°)6p\ ^4D$	41	*A*
$4f5d(^3H\ °)6p$	^2I	$6^1/_2$	34513.468	1.079	84	8	$(^3H°)\ ^4H$	16	*H*
$4f6s(^3F°)6p$	^4D	$1^1/_2$	34767.688	0.974	18	17	$4f5d(^3D°)6p\ ^2D$	30	*H*
$4f5d(^3P°)6p$	^4P	$2^1/_2$	34813.202	1.269	28	16	$(^3D°)\ ^2F$	44	*H*
$4f5d(^1F°)6p$	^2G	$3^1/_2$	34920.788	1.109	25	20	$(^3D°)\ ^4D$	47	*A*
$4f5d(^3D°)6p$	^4F	$4^1/_2$	34928.969	1.275	38	22	$5d^3\ ^4F$	37	*H*
$4f6s(^3F°)6p$	^4D	$2^1/_2$	34934.421	1.134	29	17	$(^3F°)\ ^4F$	38	*A*
$4f5d(^3P°)6p$	^4S	$1^1/_2$	35197.840	0.999	61	8	$(^3P°)\ ^2P$	32	*H*
$4f5d(^3P°)6p$	^4P	$2^1/_2$	35225.656	1.217	23	10	$(^3D°)\ ^2F$	43	*H*
$4f6s(^3F°)6p$	^4G	$3^1/_2$	35346.282	1.119	18	16	$(^3F°)\ ^4F$	39	*A*
$4f5d(^3D°)6p$	^2D	$1^1/_2$	35457.318	2.799	19	19	$(^3P°)\ ^2D$	29	*H*
$4f6s(^3F°)6p$	^4D	$3^1/_2$	35558.702	1.197	15	15	$(^3F°)\ ^4G$	41	*A*
$4f5d(^3G°)6p$	^2H	$5^1/_2$	35716.083	1.096	61	9	$(^3H°)\ ^2H$	28	*H*
$4f6s(^1F°)6p$	^2G	$4^1/_2$	35807.568	1.199	26	15	$(^3F°)\ ^2G$	38	*H*
$4f6s(^3F°)6p$	^4G	$3^1/_2$	35925.682	1.075	17	16	$(^3F°)\ ^4D$	44	*H*
$4f6s(^3F°)6p$	^4D	$3^1/_2$	36112.021	1.184	20	19	$4f5d(^1F°)6p\ ^2F$	46	*H*
$4f6s(^1F°)6p$	^2F	$2^1/_2$	36137.604	1.060	20	19	$4f5d(^3D°)6p\ ^2D$	40	*H*
$4f6s(^3F°)6p$	^4G	$4^1/_2$	36202.557	1.186	47	14	$4f5d(^3H°)6p\ ^4G$	40	*H*
$4f5d(^3P°)6p$	^2P	$^1/_2$	36288.661		36	15	$5d^2(^3P)6s\ ^2P$	17	*G*
$4f5d(^3P°)6p$	^4S	$1^1/_2$	36516.798		25	22	$(^3P°)\ ^2P$	38	*H*
$4f5d(^3D°)6p$	^2D	$2^1/_2$	36844.305	1.091	18	16	$4f6s(^1F°)6p\ ^2D$	45	*H*
$4f6s(^1F°)6p$	^2G	$3^1/_2$	36893.770	1.062	21	17	$4f5d(^3D°)6p\ ^2F$	40	*H*
$4f5d(^1H°)6p$	^2H	$4^1/_2$	36923.789	1.104	27	12	$(^1F°)\ ^2G$	42	*H*
$4f5d(^1F°)6p$	^2D	$1^1/_2$	37078.879	0.695	20	18	$5d^2(^3F)6s\ ^4F$	28	*H*
$4f6s(^3F°)6p$	^4G	$4^1/_2$	37196.137	1.175	17	15	$(^3F°)\ ^4F$	35	*H*
$4f5d(^3P°)6p$	^2D	$1^1/_2$	37232.438	0.625	25	25	$5d^2(^3F)6s\ ^4F$	30	*H*
$4f5d(^1F°)6p$	^2F	$2^1/_2$	37342.327	1.194	19	16	$4f^2(^1S)5d\ ^2D$	41	*H*
$4f5d(^3P°)6p$	^4D	$1^1/_2$	37530.630	1.112	27	12	$4f6s(^3F°)6p\ ^4D$	31	*H*
$4f5d(^1F°)6p$	^2F	$3^1/_2$	37588.473	1.142	38	19	$(^3D°)\ ^2F$	44	*H*
$4f6s(^3F°)6p$	^4D	$^1/_2$	37615.734		40	30	$4f5d(^3P°)6p\ ^4D$	16	*G*
$4f5d(^3P°)6p$	^2D	$2^1/_2$	37652.091	1.108	29	25	$(^3P°)\ ^4D$	46	*H*

TABLE 3. *Even energy levels of* Ce II—Continued

First component						Second component			
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$4f^2(^1S)5d$	^2D	$1^1/_2$	37804.434	0.908	14	14	$5d^2(^3F)6s\ ^4F$	32	*H*
$5d^2(^3F)6s$	^4F	$2^1/_2$	37848.550	1.082	49	23	$4f5d(^3G^\circ)6p\ ^4F$	36	*H*
$4f5d(^1H^\circ)6p$	^2H	$5^1/_2$	37970.532		56	22	$5d^3\ ^2H$	30	*H*
$5d^3$	^2G	$3^1/_2$	37973.771		53	13	$4f5d(^1F^\circ)6p\ ^2G$	40	*H*
$4f5d(^1F^\circ)6p$	^2G	$4^1/_2$	38134.400	0.621	25	22	$(^1H^\circ)\ ^2H$	29	*H*
$4f6s(^3F^\circ)6p$	^4G	$5^1/_2$	38137.682		71	13	$4f5d(^3H^\circ)6p\ ^4G$	30	*H*
$4f5d(^3P^\circ)6p$	^2S	$^1/_2$	38269.974		33	23	$5d^3\ ^4P$	17	*G*
$4f6s(^1F^\circ)6p$	^2D	$1^1/_2$	38452.750		24	15	$(^3F^\circ)\ ^4D$	32	*H*
$4f5d(^3D^\circ)6p$	^2D	$2^1/_2$	38529.021	1.169	19	12	$4f^2(^1S)5d\ ^2D$	42	*H*
$5d^3$	^2G	$4^1/_2$	38541.873	1.097	35	10	$4f5d(^1H^\circ)6p\ ^2G$	43	*H*
$5d^2(^3F)6s$	^4F	$3^1/_2$	38809.476	1.192	53	22	$4f5d(^3G^\circ)6p\ ^4F$	37	*H*
$4f6s(^3F^\circ)6p$	^4D	$2^1/_2$	38832.709	1.273	35	13	$(^1F^\circ)\ ^2D$	43	*H*
$4f5d(^3P^\circ)6p$	^2S	$^1/_2$	38892.501		30	24	$5d^3\ ^4P$	15	*G*
$5d^3$	^4P	$1^1/_2$	38937.812	1.399	34	9	$4f5d(^3P^\circ)6p\ ^2P$	29	*H*
$4f5d(^3P^\circ)6p$	^4D	$3^1/_2$	39394.990	1.396	42	23	$4f6s(^3F^\circ)6p\ ^4D$	36	*H*
$5d^3$	^4P	$2^1/_2$	39838.445	1.577	67	16	$4f^2(^3P)5d\ ^4P$	31	*H*
$5d^3$	^2P	$^1/_2$	39855.395		30	22	^4P	16	*G*
$5d^2(^3F)6s$	^4F	$4^1/_2$	39871.833		63	22	$4f5d(^3G^\circ)6p\ ^4F$	29	*H*
$5d^3$	^2P	$1^1/_2$	40511.127		27	22	^4P	30	*H*
$4f5d(^1H^\circ)6p$	^2I	$5^1/_2$	40673.575		74	13	$5d^3\ ^2H$	24	*H*
$4f5d(^1H^\circ)6p$	^2G	$4^1/_2$	40858.205		45	14	$(^1H^\circ)\ ^2H$	38	*H*
$5d^3$	^2H	$4^1/_2$	41083.294		49	16	$4f5d(^1H^\circ)6p\ ^2H$	29	*H*
$4f5d(^1H^\circ)6p$	^2G	$3^1/_2$	41085.208		57	14	$5d^2(^1G)6s\ ^2G$	32	*H*
$5d^2(^3F)6s$	^2F	$2^1/_2$	41198.309		51	9	$5d^3\ ^2F$	33	*H*
$5d^3$	^2H	$5^1/_2$	41289.971	1.090	53	27	$4f5d(^1H^\circ)6p\ ^2H$	24	*H*
$4f5d(^1P^\circ)6p$	^2P	$^1/_2$	41589.12		73	13	$(^3P^\circ)\ ^2S$	10	*G*
$4f5d(^1P^\circ)6p$	^2D	$1^1/_2$	41748.279	0.880	23	16	$5d^2(^1D)6s\ ^2D$	30	*H*
$4f5d(^1H^\circ)6p$	^2I	$6^1/_2$	41992.356		90	6	$(^3H^\circ)\ ^2I$	11	*H*
$5d^2(^1D)6s$	^2D	$2^1/_2$	42033.653	1.161	21	20	$4f^2(^1S)5d\ ^2D$	35	*H*
$4f5d(^1P^\circ)6p$	^2P	$1^1/_2$	42458.743		40	10	$5d^3\ ^2D1$	23	*G*
$5d^2(^3F)6s$	^2F	$3^1/_2$	42573.191	1.143	52	19	$5d^3\ ^2F$	30	*H*
$4f5d(^1P^\circ)6p$	^2D	$1^1/_2$	43167.878		35	32	$(^1P^\circ)\ ^2P$	24	*G*
$4f5d(^1P^\circ)6p$	^2S	$^1/_2$	43334.332		66	15	$(^3P^\circ)\ ^2S$	12	*G*
$4f5d(^1P^\circ)6p$	^2D	$2^1/_2$	43460.533	1.170	64	7	$5d^3\ ^2D1$	32	*H*
$5d^2(^3P)6s$	^4P	$^1/_2$	43643.230		75	9	$4f5d(^3D^\circ)6p\ ^4P$	13	*G*
$5d^2(^3P)6s$	^4P	$1^1/_2$	44081.375		77	7	$4f5d(^3D^\circ)6p\ ^4P$	21	*G*
$5d^2(^3P)6s$	^4P	$2^1/_2$	44594.928	1.573	68	9	$5d^3\ ^2D1$	25	*H*
$5d^3$	$^2D1$	$1^1/_2$	46987.371		31	24	$5d^2(^1D)6s\ ^2D$	11	*G*

TABLE 3. *Even energy levels of* Ce II—Continued

First component						Second component			
Configuration	Term	J	Level	g	%			n, ref.	
			cm^{-1}						
$5d^2(^1D)6s$	^2D	$2^1/_2$	47466.445		34	29	$5d^3$ $^2D1$	11	*C*
$5d^2(^1G)6s$	^2G	$3^1/_2$	47489.280		48	22	$4f6s(^3F^\circ)6p$ ^2G	21	*G*
$4f6s(^3F^\circ)6p$	^2F	$2^1/_2$	48024.675		36	28	$5d^3$ ^2F	28	*G*
$5d^2(^1G)6s$	^2G	$4^1/_2$	48151.739		67	8	$4f6s(^1F^\circ)6p$ ^2G	15	*B*
$4f6s(^3F^\circ)6p$	^2D	$1^1/_2$	48630.464		26	22	$5d^2(^1D)6s$ ^2D	11	*B*
$5d^3$	^2F	$3^1/_2$	48657.336		49	19	$5d^2(^3F)6s$ ^2F	15	*B*
$5d^3$	^2F	$2^1/_2$	49089.486		38	18	$4f6s(^3F^\circ)6p$ ^2F	14	*C*
$4f6s(^3F^\circ)6p$	^2F	$3^1/_2$	50368.336		24	15	$(^3F^\circ)$ ^2G	13	*B*
$5d(^2D)6s^2(^1S)$	^2D	$2^1/_2$	50564.294		32	26	$4f6s(^3F^\circ)6p$ ^2D	8	*B*
$4f6s(^3F^\circ)6p$	^2G	$3^1/_2$	51171.581		23	20	$(^3F^\circ)$ ^2F	12	*C*
$4f6s(^3F^\circ)6p$	^2G	$4^1/_2$	52058.587		51	16	$(^1F^\circ)$ ^2G	11	*B*

TABLE 4. *Spectral lines of* Ce II

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
2512.814	6	*WA*	39784.042			2582.320	1	*GJ*	38713.280	$3745°_{1\frac{1}{2}}-42458_{1\frac{1}{2}}$	12
2513.304	60	*WA*	39776.287	$7713°_{4\frac{1}{2}}-47489_{3\frac{1}{2}}$	96	2582.471	4	*WA*	38711.016		
2513.868	3	*WA*	39767.363			2582.590	2	*MT*	38709.233		
2514.862	5	*WA*	39751.646			2582.793	8	*WA*	38706.191		
2515.360	5	*WA*	39743.777	$8280°_{2\frac{1}{2}}-48024_{2\frac{1}{2}}$	48	2583.128	8	*WA*	38701.171	$2382°_{4\frac{1}{2}}-41083_{4\frac{1}{2}}$	124
2518.505	80	*WA*	39694.149			2584.203	8	*WA*	38685.073	$8804°_{4\frac{1}{2}}-47489_{3\frac{1}{2}}$	17
2519.026	30	*WA*	39685.940	$987°_{4\frac{1}{2}}-40673_{5\frac{1}{2}}$	−23	2585.187	4	*WA*	38670.349	$3363°_{2\frac{1}{2}}-42033_{2\frac{1}{2}}$	123
2519.850	1	*GJ*	39672.964	$1410°_{4\frac{1}{2}}-41083_{4\frac{1}{2}}$	−25	2586.562	4	*WA*	38649.793		
2520.540	5	*WA*	39662.104			2587.883	3	*WA*	38630.066	$5964°_{3\frac{1}{2}}-44594_{2\frac{1}{2}}$	34
2524.000	2	*WA*	39607.737	$2140°_{0\frac{1}{2}}-41748_{1\frac{1}{2}}$	−49	2588.426	5	*WA*	38621.962	$10646_{5\frac{1}{2}}-49267°_{4\frac{1}{2}}$	51
2526.422	3	*WA*	39569.769	$10798°_{2\frac{1}{2}}-50368_{3\frac{1}{2}}$	−20	2588.885	8	*WA*	38615.115	$11949°_{3\frac{1}{2}}-50564_{2\frac{1}{2}}$	1
2528.287	4	*WA*	39540.582			2589.559	4	*WA*	38605.065	$9725_{3\frac{1}{2}}-48330°_{3\frac{1}{2}}$	9
2531.147	4	*WA*	39495.907	$7092_{5\frac{1}{2}}-46588°_{5\frac{1}{2}}$	42	2590.805	5	*WA*	38586.500	$7011_{4\frac{1}{2}}-45598°_{3\frac{1}{2}}$	4
2532.415	7	*WA*	39476.133	$5118°_{2\frac{1}{2}}-44594_{2\frac{1}{2}}$	11	2591.885	3	*WA*	38570.423		
2534.180	4	*WA*	39448.640	$2140°_{0\frac{1}{2}}-41589_{0\frac{1}{2}}$	−2	2592.338	20	*WA*	38563.683	$2634°_{2\frac{1}{2}}-41198_{2\frac{1}{2}}$	41
2534.866	3	*WA*	39437.965	$2595°_{1\frac{1}{2}}-42033_{2\frac{1}{2}}$	−45	2592.801	5	*WA*	38556.797	$2641°_{3\frac{1}{2}}-41198_{2\frac{1}{2}}$	48
2542.361	5	*WA*	39321.708			2593.802	4	*WA*	38541.918	$0°_{3\frac{1}{2}}-38541_{4\frac{1}{2}}$	46
2543.086	60	*WA*	39310.499	$9778°_{2\frac{1}{2}}-49089_{2\frac{1}{2}}$	0	2594.787	3	*WA*	38527.289		
2543.536	3	*WA*	39303.544	$10314_{4\frac{1}{2}}-49617°_{5\frac{1}{2}}$	7	2595.302	3	*WA*	38519.644		
2544.269	5	*WA*	39292.222			2595.575	5	*WA*	38515.592	$10114°_{2\frac{1}{2}}-48630_{1\frac{1}{2}}$	19
2544.376	3	*WA*	39290.569	$8175°_{2\frac{1}{2}}-47466_{2\frac{1}{2}}$	−12	2596.358	4	*WA*	38503.978	$2581°_{4\frac{1}{2}}-41085_{3\frac{1}{2}}$	21
2546.140	1	*GJ*	39263.350	$1410°_{4\frac{1}{2}}-40673_{5\frac{1}{2}}$	80	2596.485	4	*WA*	38502.095	$2581°_{4\frac{1}{2}}-41083_{4\frac{1}{2}}$	58
2547.187	3	*WA*	39247.212	$7341_{5\frac{1}{2}}-46588°_{5\frac{1}{2}}$	89	2598.250	5	*WA*	38475.942	$2382°_{4\frac{1}{2}}-40858_{4\frac{1}{2}}$	−16
2547.586	3	*WA*	39241.066	$7746°_{2\frac{1}{2}}-46987_{1\frac{1}{2}}$	−119	2600.434	5	*WA*	38443.629	$2641°_{3\frac{1}{2}}-41085_{3\frac{1}{2}}$	−25
2547.681	3	*WA*	39239.603			2600.788	5	*WA*	38438.397		
2548.683	90	*WA*	39224.177	$8927°_{5\frac{1}{2}}-48151_{4\frac{1}{2}}$	−47	2602.088	6	*WA*	38419.195	$11949°_{3\frac{1}{2}}-50368_{3\frac{1}{2}}$	39
2548.802	50	*WA*	39222.346	$11949°_{3\frac{1}{2}}-51171_{3\frac{1}{2}}$	−55	2602.772	5	*WA*	38409.098		
2549.260	3	*WA*	39215.299			2603.444	3	*WA*	38399.185	$13659°_{4\frac{1}{2}}-52058_{4\frac{1}{2}}$	−72
2549.717	2	*WA*	39208.271	$8280°_{2\frac{1}{2}}-47489_{3\frac{1}{2}}$	−62	2604.590	5	*WA*	38382.291	$10274°_{3\frac{1}{2}}-48657_{3\frac{1}{2}}$	−73
2550.095	4	*WA*	39202.460			2605.378	5	*WA*	38370.683	$2140°_{0\frac{1}{2}}-40511_{1\frac{1}{2}}$	48
2551.206	2	*WA*	39185.389	$8280°_{2\frac{1}{2}}-47466_{2\frac{1}{2}}$	−109	2606.088	2	*WA*	38360.230	$5283°_{0\frac{1}{2}}-43643_{0\frac{1}{2}}$	29
2551.771	20	*WA*	39176.713			2607.344	3	*WA*	38341.752	$5118°_{2\frac{1}{2}}-43460_{2\frac{1}{2}}$	25
2552.261	4	*WA*	39169.193	$7818°_{1\frac{1}{2}}-46987_{1\frac{1}{2}}$	−27	2609.116	3	*WA*	38315.713		
2553.344	5	*WA*	39152.580	$2595°_{1\frac{1}{2}}-41748_{1\frac{1}{2}}$	−54	2609.502	50	*WA*	38310.046	$8278_{5\frac{1}{2}}-46588°_{5\frac{1}{2}}$	−30
2553.456	5	*WA*	39150.863	$7011_{4\frac{1}{2}}-46162°_{4\frac{1}{2}}$	−24	2609.900	20	*MT*	38304.204	$12260°_{3\frac{1}{2}}-50564_{2\frac{1}{2}}$	−11
2553.588	3	*WA*	39148.839			2610.334	4	*WA*	38297.836		
2555.949	5	*WA*	39112.678	$2879°_{5\frac{1}{2}}-41992_{6\frac{1}{2}}$	18	2610.531	3	*WA*	38294.946	$2563°_{5\frac{1}{2}}-40858_{4\frac{1}{2}}$	−25
2558.354	3	*WA*	39075.913			2610.775	3	*WA*	38291.367	$2382°_{4\frac{1}{2}}-40673_{5\frac{1}{2}}$	39
2561.393	3	*WA*	39029.553	$10058_{6\frac{1}{2}}-49087°_{7\frac{1}{2}}$	−100	2610.985	3	*WA*	38288.288	$3745°_{1\frac{1}{2}}-42033_{2\frac{1}{2}}$	111
2561.511	6	*WA*	39027.756	$11340°_{3\frac{1}{2}}-50368_{3\frac{1}{2}}$	9	2613.897	50	*MT*	38245.635	$9778°_{2\frac{1}{2}}-48024_{2\frac{1}{2}}$	−53
2562.424	25	*WA*	39013.851	$9316_{3\frac{1}{2}}-48330°_{3\frac{1}{2}}$	−26	2614.292	3	*WA*	38239.857	$3508°_{0\frac{1}{2}}-41748_{1\frac{1}{2}}$	49
2566.374	4	*WA*	38953.807	$10314_{4\frac{1}{2}}-49267°_{4\frac{1}{2}}$	−12	2614.566	5	*WA*	38235.850	$10314_{4\frac{1}{2}}-48549°_{4\frac{1}{2}}$	22
2567.679	4	*WA*	38934.011	$9723°_{4\frac{1}{2}}-48657_{3\frac{1}{2}}$	10	2615.453	3	*WA*	38222.884		
2568.705	3	*WA*	38918.460			2615.877	6	*WA*	38216.689	$2641°_{3\frac{1}{2}}-40858_{4\frac{1}{2}}$	43
2569.168	40	*WA*	38911.447	$12260°_{3\frac{1}{2}}-51171_{3\frac{1}{2}}$	−55	2617.108	2	*WA*	38198.714	$3793°_{6\frac{1}{2}}-41992_{6\frac{1}{2}}$	−7
2569.879	25	*WA*	38900.682			2617.723	5	*WA*	38189.740		
2571.361	5	*WA*	38878.263	$9778°_{2\frac{1}{2}}-48657_{3\frac{1}{2}}$	−86	2619.552	4	*WA*	38163.077	$11454_{6\frac{1}{2}}-49617°_{5\frac{1}{2}}$	79
2571.930	7	*WA*	38869.663	$3703°_{3\frac{1}{2}}-42573_{3\frac{1}{2}}$	66	2619.715	4	*WA*	38160.703		
2573.141	50	*WA*	38851.371	$9778°_{2\frac{1}{2}}-48630_{1\frac{1}{2}}$	−106	2619.804	6	*WA*	38159.407	$11458_{5\frac{1}{2}}-49617°_{5\frac{1}{2}}$	60
2575.933	7	*WA*	38809.263			2619.960	3	*WA*	38157.135	$5924°_{1\frac{1}{2}}-44081_{1\frac{1}{2}}$	−35

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
2620.931	5	WA	38142.999	$9316_{3\frac{1}{2}} - 47459^{\circ}_{2\frac{1}{2}}$	17	2660.638	4	WA	37573.791	$4459^{\circ}_{3\frac{1}{2}} - 42033_{2\frac{1}{2}}$	9
2622.784	4	WA	38116.053	$10035^{\circ}_{5\frac{1}{2}} - 48151_{4\frac{1}{2}}$	25	2661.352	2	MT	37563.712	$6517^{\circ}_{2\frac{1}{2}} - 44081_{1\frac{1}{2}}$	−43
2622.972	4	WA	38113.321	$4459^{\circ}_{3\frac{1}{2}} - 42573_{3\frac{1}{2}}$	2	2661.459	1	WA	37562.202	$5010^{\circ}_{2\frac{1}{2}} - 42573_{3\frac{1}{2}}$	−118
2623.315	5	WA	38108.338	$12260^{\circ}_{3\frac{1}{2}} - 50368_{3\frac{1}{2}}$	90	2661.617	7	WA	37559.972	$6521^{\circ}_{1\frac{1}{2}} - 44081_{1\frac{1}{2}}$	−70
2624.418	4	WA	38092.322	$2581^{\circ}_{4\frac{1}{2}} - 40673_{5\frac{1}{2}}$	5	2662.024	6	WA	37554.230	$987^{\circ}_{4\frac{1}{2}} - 38541_{4\frac{1}{2}}$	−31
2625.186	3	WA	38081.179			2662.170	3	WA	37552.170	$13012^{\circ}_{2\frac{1}{2}} - 50564_{2\frac{1}{2}}$	−38
2625.454	3	WA	38077.292	$6517^{\circ}_{2\frac{1}{2}} - 44594_{2\frac{1}{2}}$	−16	2662.587	5	WA	37546.289	$4201^{\circ}_{1\frac{1}{2}} - 41748_{1\frac{1}{2}}$	−96
2626.265	4	WA	38065.535			2663.297	4	WA	37536.280	$5924^{\circ}_{1\frac{1}{2}} - 43460_{2\frac{1}{2}}$	−48
2629.977	3	WA	38011.811			2663.429	3	WA	37534.420	$11015_{3\frac{1}{2}} - 48549^{\circ}_{4\frac{1}{2}}$	10
2630.616	5	WA	38002.578	$12365^{\circ}_{4\frac{1}{2}} - 50368_{3\frac{1}{2}}$	40	2663.638	4	WA	37531.475	$6549^{\circ}_{2\frac{1}{2}} - 44081_{1\frac{1}{2}}$	9
2632.106	4	WA	37981.067			2664.048	4	WA	37525.699		
2634.547	5	WA	37945.878			2664.737	5	WA	37515.997		
2635.150	60	WA	37937.196	$7011_{4\frac{1}{2}} - 44949^{\circ}_{4\frac{1}{2}}$	−10	2665.002	7	WA	37512.267	$13659^{\circ}_{4\frac{1}{2}} - 51171_{3\frac{1}{2}}$	6
2636.355	4	WA	37919.856			2665.146	2	WA	37510.240	$10820_{2\frac{1}{2}} - 48330^{\circ}_{3\frac{1}{2}}$	−63
2636.658	2	WA	37915.499	$2595^{\circ}_{1\frac{1}{2}} - 40511_{1\frac{1}{2}}$	17	2665.271	8	WA	37508.481	$11759_{5\frac{1}{2}} - 49267^{\circ}_{4\frac{1}{2}}$	−33
2637.055	6	WA	37909.792	$10114^{\circ}_{2\frac{1}{2}} - 48024_{2\frac{1}{2}}$	0	2666.135	2	WA	37496.327	$3793^{\circ}_{6\frac{1}{2}} - 41289_{5\frac{1}{2}}$	−9
2637.457	2	WA	37904.014	$10646_{5\frac{1}{2}} - 48549^{\circ}_{4\frac{1}{2}}$	94	2666.255	2	WA	37494.639	$3703^{\circ}_{3\frac{1}{2}} - 41198_{2\frac{1}{2}}$	−75
2637.958	5	WA	37896.815			2666.494	60	WA	37491.279	$3593^{\circ}_{4\frac{1}{2}} - 41085_{3\frac{1}{2}}$	−52
2638.104	3	WA	37894.718			2666.628	3	WA	37489.395	$3593^{\circ}_{4\frac{1}{2}} - 41083_{4\frac{1}{2}}$	−16
2638.807	8	WA	37884.623	$8278_{5\frac{1}{2}} - 46162^{\circ}_{4\frac{1}{2}}$	−14	2668.219	4	WA	37467.042	$8131_{4\frac{1}{2}} - 45598^{\circ}_{3\frac{1}{2}}$	−41
2639.367	5	WA	37876.586	$2634^{\circ}_{2\frac{1}{2}} - 40511_{1\frac{1}{2}}$	125	2669.228	1	WA	37452.880	$3745^{\circ}_{1\frac{1}{2}} - 41198_{2\frac{1}{2}}$	46
2639.770	4	WA	37870.804			2669.585	3	WA	37447.872	$5010^{\circ}_{2\frac{1}{2}} - 42458_{1\frac{1}{2}}$	0
2640.646	5	WA	37858.241	$11759_{5\frac{1}{2}} - 49617^{\circ}_{5\frac{1}{2}}$	9	2671.185	3	WA	37425.442		
2640.750	5	WA	37856.750	$7092_{5\frac{1}{2}} - 44949^{\circ}_{4\frac{1}{2}}$	5	2671.661	4	WA	37418.775		
2641.456	5	WA	37846.633	$10703_{4\frac{1}{2}} - 48549^{\circ}_{4\frac{1}{2}}$	−51	2671.908	5	WA	37415.316		
2642.483	4	WA	37831.924	$10798^{\circ}_{2\frac{1}{2}} - 48630_{1\frac{1}{2}}$	23	2672.280	3	WA	37410.108	$5924^{\circ}_{1\frac{1}{2}} - 43334_{0\frac{1}{2}}$	−21
2644.027	3	WA	37809.833			2672.403	4	WA	37408.386		
2646.640	3	WA	37772.507			2672.777	3	WA	37403.151		
2647.007	4	WA	37767.270	$4266^{\circ}_{3\frac{1}{2}} - 42033_{2\frac{1}{2}}$	12	2673.073	40	WA	37399.010	$10646_{5\frac{1}{2}} - 48045^{\circ}_{6\frac{1}{2}}$	−19
2647.105	25	WA	37765.871	$9723^{\circ}_{4\frac{1}{2}} - 47489_{3\frac{1}{2}}$	−73	2673.545	6	WA	37392.408	$7202^{\circ}_{2\frac{1}{2}} - 44594_{2\frac{1}{2}}$	10
2647.258	3	WA	37763.689	$11325^{\circ}_{2\frac{1}{2}} - 49089_{2\frac{1}{2}}$	−15	2673.805	3	WA	37388.772		
2648.247	3	WA	37749.587	$10274^{\circ}_{3\frac{1}{2}} - 48024_{2\frac{1}{2}}$	−116	2674.447	3	WA	37379.797	$3703^{\circ}_{3\frac{1}{2}} - 41083_{4\frac{1}{2}}$	98
2648.299	20	WA	37748.845	$11340^{\circ}_{3\frac{1}{2}} - 49089_{2\frac{1}{2}}$	−42	2674.587	4	WA	37377.841	$10088^{\circ}_{1\frac{1}{2}} - 47466_{2\frac{1}{2}}$	36
2649.330	25	WA	37734.157	$9725_{3\frac{1}{2}} - 47459^{\circ}_{2\frac{1}{2}}$	−3	2674.830	6	WA	37374.446	$10114^{\circ}_{2\frac{1}{2}} - 47489_{3\frac{1}{2}}$	49
2650.298	3	WA	37720.375			2675.733	3	WA	37361.833		
2650.682	2	WA	37714.911	$2140^{\circ}_{0\frac{1}{2}} - 39855_{0\frac{1}{2}}$	4	2676.121	5	WA	37356.416		
2651.009	240	WA	37710.259	$9778^{\circ}_{2\frac{1}{2}} - 47489_{3\frac{1}{2}}$	−34	2676.355	5	WA	37353.150	$9634^{\circ}_{1\frac{1}{2}} - 46987_{1\frac{1}{2}}$	−31
2651.418	4	WA	37704.442	$9725_{3\frac{1}{2}} - 47430^{\circ}_{3\frac{1}{2}}$	−8	2676.467	5	WA	37351.587	$10114^{\circ}_{2\frac{1}{2}} - 47466_{2\frac{1}{2}}$	26
2652.003	9	WA	37696.126	$3593^{\circ}_{4\frac{1}{2}} - 41289_{5\frac{1}{2}}$	37	2676.623	3	WA	37349.411		
2652.152	4	WA	37694.008			2676.755	4	WA	37347.569		
2652.333	2	WA	37691.436	$8896_{5\frac{1}{2}} - 46588^{\circ}_{5\frac{1}{2}}$	34	2677.293	3	WA	37340.064		
2652.531	3	WA	37688.622			2677.592	8	WA	37335.895	$7259^{\circ}_{3\frac{1}{2}} - 44594_{2\frac{1}{2}}$	42
2654.847	1	WA	37655.746	$13515^{\circ}_{3\frac{1}{2}} - 51171_{3\frac{1}{2}}$	9	2678.618	3	WA	37321.595		
2656.440	6	WA	37633.166	$11454_{6\frac{1}{2}} - 49087^{\circ}_{7\frac{1}{2}}$	−12	2678.946	5	WA	37317.026		
2656.587	2	WA	37631.084	$8531_{3\frac{1}{2}} - 46162^{\circ}_{4\frac{1}{2}}$	70	2679.827	3	WA	37304.758	$11325^{\circ}_{2\frac{1}{2}} - 48630_{1\frac{1}{2}}$	76
2656.844	25	WA	37627.444	$10703_{4\frac{1}{2}} - 48330^{\circ}_{3\frac{1}{2}}$	−40	2680.425	3	WA	37296.436	$7341_{5\frac{1}{2}} - 44637^{\circ}_{6\frac{1}{2}}$	−104
2657.789	4	WA	37614.066	$4844^{\circ}_{1\frac{1}{2}} - 42458_{1\frac{1}{2}}$	−32	2681.659	5	WA	37279.275		
2658.383	5	WA	37605.662	$12762^{\circ}_{4\frac{1}{2}} - 50368_{3\frac{1}{2}}$	−41	2682.351	3	WA	37269.658	$11387^{\circ}_{3\frac{1}{2}} - 48657_{3\frac{1}{2}}$	53
2659.603	2	WA	37588.413	$0^{\circ}_{3\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−59	2682.727	50	WA	37264.435	$3593^{\circ}_{4\frac{1}{2}} - 40858_{4\frac{1}{2}}$	112
2659.716	5	WA	37586.816	$8278_{5\frac{1}{2}} - 45864^{\circ}_{5\frac{1}{2}}$	−79	2683.057	4	WA	37259.851	$2595^{\circ}_{1\frac{1}{2}} - 39855_{0\frac{1}{2}}$	101

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
2683.166	3	*WA*	37258.338			2711.244	5	*WA*	36872.507	$10114°_{2\frac{1}{2}}-46987_{1\frac{1}{2}}$	23
2683.963	3	*WA*	37247.275			2711.935	3	*WA*	36863.112		
2684.244	4	*WA*	37243.376			2712.372	4	*WA*	36857.174		
2684.418	3	*WA*	37240.962			2712.693	3	*WA*	36852.813		
2684.697	4	*WA*	37237.092	$4511°_{2\frac{1}{2}}-41748_{1\frac{1}{2}}$	70	2712.976	5	*WA*	36848.969		
2685.038	5	*MT*	37232.363	$0°_{3\frac{1}{2}}-37232_{1\frac{1}{2}}$	−74	2713.058	1	*WA*	36847.855	$10641°_{2\frac{1}{2}}-47489_{3\frac{1}{2}}$	17
2685.428	4	*WA*	37226.956	$10924°_{4\frac{1}{2}}-48151_{4\frac{1}{2}}$	93	2713.295	4	*WA*	36844.637		
2685.480	1	*WA*	37226.235	$10798°_{2\frac{1}{2}}-48024_{2\frac{1}{2}}$	116	2714.723	6	*WA*	36825.257		
2685.774	3	*WA*	37222.161			2714.975	3	*WA*	36821.838		
2686.333	4	*WA*	37214.415	$10274°_{3\frac{1}{2}}-47489_{3\frac{1}{2}}$	107	2715.170	60	*WA*	36819.194		
2686.766	4	*WA*	37208.418	$9778°_{2\frac{1}{2}}-46987_{1\frac{1}{2}}$	37	2715.243	30	*WA*	36818.204		
2687.621	4	*WA*	37196.582			2715.314	4	*WA*	36817.242		
2687.988	25	*WA*	37191.504	$10274°_{3\frac{1}{2}}-47466_{2\frac{1}{2}}$	30	2715.426	5	*WA*	36815.723		
2688.160	4	*WA*	37189.124	$4844°_{1\frac{1}{2}}-42033_{2\frac{1}{2}}$	116	2715.746	6	*WA*	36811.385		
2689.176	3	*WA*	37175.075			2715.903	3	*WA*	36809.258		
2689.483	4	*WA*	37170.831			2716.146	3	*WA*	36805.965		
2690.652	1	*WA*	37154.683	$3703°_{3\frac{1}{2}}-40858_{4\frac{1}{2}}$	72	2716.463	3	*WA*	36801.670		
2690.979	5	*WA*	37150.168	$987°_{4\frac{1}{2}}-38137_{5\frac{1}{2}}$	97	2716.775	2	*WA*	36797.444	$2140°_{0\frac{1}{2}}-38937_{1\frac{1}{2}}$	124
2691.219	5	*WA*	37146.855	$987°_{4\frac{1}{2}}-38134_{4\frac{1}{2}}$	67	2717.275	30	*WA*	36790.673		
2691.687	25	*WA*	37140.397	$11949°_{3\frac{1}{2}}-49089_{2\frac{1}{2}}$	100	2718.087	3	*WA*	36779.683		
2692.013	5	*WA*	37135.899			2718.295	2	*WA*	36776.869	$7818°_{1\frac{1}{2}}-44594_{2\frac{1}{2}}$	88
2693.027	6	*WA*	37121.917	$6521°_{1\frac{1}{2}}-43643_{0\frac{1}{2}}$	20	2718.338	3	*WA*	36776.287		
2693.447	7	*WA*	37116.129	$10314_{4\frac{1}{2}}-47430°_{3\frac{1}{2}}$	108	2719.117	2	*WA*	36765.751	$3745°_{1\frac{1}{2}}-40511_{1\frac{1}{2}}$	100
2695.215	10	*WA*	37091.783			2719.237	5	*WA*	36764.129	$11387°_{3\frac{1}{2}}-48151_{4\frac{1}{2}}$	121
2695.961	50	*WA*	37081.520	$4910°_{5\frac{1}{2}}-41992_{6\frac{1}{2}}$	127	2719.345	3	*WA*	36762.669	$8131_{4\frac{1}{2}}-44893°_{3\frac{1}{2}}$	−52
2696.080	100	*PK*	37079.885	$3593°_{4\frac{1}{2}}-40673_{5\frac{1}{2}}$	192	2719.979	30	*WA*	36754.100	$5819°_{4\frac{1}{2}}-42573_{3\frac{1}{2}}$	23
2697.031	3	*WA*	37066.809			2720.124	4	*WA*	36752.141		
2698.033	3	*WA*	37053.045			2721.132	5	*WA*	36738.528	$4459°_{3\frac{1}{2}}-41198_{2\frac{1}{2}}$	91
2698.359	6	*WA*	37048.568			2721.990	5	*WA*	36726.948	$10703_{4\frac{1}{2}}-47430°_{3\frac{1}{2}}$	70
2699.528	4	*WA*	37032.526			2722.197	3	*WA*	36724.155	$1410°_{4\frac{1}{2}}-38134_{4\frac{1}{2}}$	60
2700.231	5	*WA*	37022.885	$5010°_{2\frac{1}{2}}-42033_{2\frac{1}{2}}$	102	2722.757	2	*WA*	36716.603	$7878°_{3\frac{1}{2}}-44594_{2\frac{1}{2}}$	3
2700.471	5	*WA*	37019.594	$7061°_{0\frac{1}{2}}-44081_{1\frac{1}{2}}$	58	2723.309	10	*MT*	36709.161		
2700.682	3	*WA*	37016.702			2723.381	100	*WA*	36708.190	$11949°_{3\frac{1}{2}}-48657_{3\frac{1}{2}}$	44
2700.974	1	*WA*	37012.701	$2382°_{4\frac{1}{2}}-39394_{3\frac{1}{2}}$	−45	2723.888	3	*WA*	36701.358	$7722_{2\frac{1}{2}}-44423°_{1\frac{1}{2}}$	69
2701.012	3	*WA*	37012.180	$10454°_{1\frac{1}{2}}-47466_{2\frac{1}{2}}$	8	2724.071	3	*WA*	36698.893	$11325°_{2\frac{1}{2}}-48024_{2\frac{1}{2}}$	0
2701.101	2	*WA*	37010.961	$4737°_{2\frac{1}{2}}-41748_{1\frac{1}{2}}$	55	2724.679	1	*WA*	36690.704	$10798°_{2\frac{1}{2}}-47489_{3\frac{1}{2}}$	−20
2701.703	5	*WA*	37002.714	$3508°_{0\frac{1}{2}}-40511_{1\frac{1}{2}}$	58	2724.751	3	*WA*	36689.734	$14481°_{2\frac{1}{2}}-51171_{3\frac{1}{2}}$	74
2702.539	6	*WA*	36991.268			2724.948	30	*WA*	36687.082	$4511°_{2\frac{1}{2}}-41198_{2\frac{1}{2}}$	31
2702.879	4	*WA*	36986.616			2725.170	6	*WA*	36684.094	$11340°_{3\frac{1}{2}}-48024_{2\frac{1}{2}}$	17
2703.138	7	*WA*	36983.072			2725.325	4	*WA*	36682.007	$8448_{2\frac{1}{2}}-45130°_{2\frac{1}{2}}$	120
2703.495	3	*WA*	36978.189			2726.144	6	*WA*	36670.988	$8278_{5\frac{1}{2}}-44949°_{4\frac{1}{2}}$	31
2706.336	3	*WA*	36939.372			2726.371	4	*WA*	36667.935	$1873°_{3\frac{1}{2}}-38541_{4\frac{1}{2}}$	−3
2706.879	100	*WA*	36931.963	$4266°_{3\frac{1}{2}}-41198_{2\frac{1}{2}}$	51	2727.685	5	*WA*	36650.272	$6517°_{2\frac{1}{2}}-43167_{1\frac{1}{2}}$	11
2707.024	4	*WA*	36929.985			2727.960	5	*WA*	36646.577	$6521°_{1\frac{1}{2}}-43167_{1\frac{1}{2}}$	30
2707.470	3	*WA*	36923.902	$0°_{3\frac{1}{2}}-36923_{4\frac{1}{2}}$	113	2728.485	4	*WA*	36639.527	$10820_{2\frac{1}{2}}-47459°_{2\frac{1}{2}}$	119
2708.131	30	*WA*	36914.890	$5118°_{2\frac{1}{2}}-42033_{2\frac{1}{2}}$	41	2729.162	25	*WA*	36630.438	$5942°_{3\frac{1}{2}}-42573_{3\frac{1}{2}}$	46
2708.435	5	*WA*	36910.747	$6549°_{2\frac{1}{2}}-43460_{2\frac{1}{2}}$	122	2729.238	1	*WA*	36629.418	$5118°_{2\frac{1}{2}}-41748_{1\frac{1}{2}}$	−54
2708.953	6	*WA*	36903.689	$4844°_{1\frac{1}{2}}-41748_{1\frac{1}{2}}$	54	2729.538	4	*WA*	36625.392	$4459°_{3\frac{1}{2}}-41085_{3\frac{1}{2}}$	51
2709.406	30	*WA*	36897.519	$5675°_{4\frac{1}{2}}-42573_{3\frac{1}{2}}$	92	2729.683	5	*WA*	36623.447	$4459°_{3\frac{1}{2}}-41083_{4\frac{1}{2}}$	26
2711.011	6	*WA*	36875.676	$4322°_{2\frac{1}{2}}-41198_{2\frac{1}{2}}$	76	2730.076	5	*WA*	36618.175		

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
2730.699	8	*WA*	36609.821	$10820_{2\frac{1}{2}}-47430°_{3\frac{1}{2}}$	124	2760.960	3	*WA*	36208.587	$987°_{4\frac{1}{2}}-37196_{4\frac{1}{2}}$	60
2730.800	12	*WA*	36608.468	$5964°_{3\frac{1}{2}}-42573_{3\frac{1}{2}}$	173	2761.415	120	*MT*	36202.621	$8448_{2\frac{1}{2}}-44651°_{1\frac{1}{2}}$	−40
2731.358	4	*WA*	36600.989			2761.501	6	*WA*	36201.494	$7259°_{3\frac{1}{2}}-43460_{2\frac{1}{2}}$	36
2731.407	2	*WA*	36600.333	$12057°_{2\frac{1}{2}}-48657_{3\frac{1}{2}}$	104	2761.672	4	*WA*	36199.253		
2731.707	5	*WA*	36596.313	$5437°_{3\frac{1}{2}}-42033_{2\frac{1}{2}}$	83	2761.757	4	*WA*	36198.139	$2634°_{2\frac{1}{2}}-38832_{2\frac{1}{2}}$	96
2732.035	25	*WA*	36591.920	$4266°_{3\frac{1}{2}}-40858_{4\frac{1}{2}}$	112	2762.206	70	*WA*	36192.255	$8402°_{3\frac{1}{2}}-44594_{2\frac{1}{2}}$	−4
2732.166	40	*WA*	36590.165			2762.462	1	*WA*	36188.901	$10798°_{2\frac{1}{2}}-46987_{1\frac{1}{2}}$	85
2732.404	3	*WA*	36586.978			2762.890	30	*WA*	36183.296	$6389°_{4\frac{1}{2}}-42573_{3\frac{1}{2}}$	47
2732.827	50	*MT*	36581.316	$7061°_{0\frac{1}{2}}-43643_{0\frac{1}{2}}$	−75	2763.210	3	*WA*	36179.105		
2733.363	3	*WA*	36574.142			2763.722	3	*WA*	36172.403	$4910°_{5\frac{1}{2}}-41083_{4\frac{1}{2}}$	73
2733.933	3	*WA*	36566.518			2764.037	1	*WA*	36168.281	$3703°_{3\frac{1}{2}}-39871_{4\frac{1}{2}}$	43
2734.077	5	*WA*	36564.592			2764.142	3	*WA*	36166.907		
2734.154	1	*WA*	36563.562	$1410°_{4\frac{1}{2}}-37973_{3\frac{1}{2}}$	96	2764.397	5	*WA*	36163.571	$11325°_{2\frac{1}{2}}-47489_{3\frac{1}{2}}$	73
2735.562	1	*WA*	36544.744	$9053_{3\frac{1}{2}}-45598°_{3\frac{1}{2}}$	72	2764.696	4	*WA*	36159.661	$2382°_{4\frac{1}{2}}-38541_{4\frac{1}{2}}$	34
2736.326	30	*MT*	36534.541	$5924°_{1\frac{1}{2}}-42458_{1\frac{1}{2}}$	2	2765.385	5	*WA*	36150.651	$4523°_{4\frac{1}{2}}-40673_{5\frac{1}{2}}$	110
2736.665	2	*WA*	36530.015	$10058_{6\frac{1}{2}}-46588°_{5\frac{1}{2}}$	111	2765.534	5	*WA*	36148.704	$11340°_{3\frac{1}{2}}-47489_{3\frac{1}{2}}$	22
2740.577	6	*WA*	36477.874			2766.381	4	*WA*	36137.636	$0°_{3\frac{1}{2}}-36137_{2\frac{1}{2}}$	33
2741.197	1	*WA*	36469.624	$4203°_{6\frac{1}{2}}-40673_{5\frac{1}{2}}$	−16	2766.588	3	*WA*	36134.933	$3703°_{3\frac{1}{2}}-39838_{2\frac{1}{2}}$	83
2741.521	5	*WA*	36465.314	$5283°_{0\frac{1}{2}}-41748_{1\frac{1}{2}}$	64	2767.007	30	*MT*	36129.462	$2140°_{0\frac{1}{2}}-38269_{0\frac{1}{2}}$	−19
2741.957	90	*WA*	36459.516			2767.671	1	*WA*	36120.794	$7522°_{0\frac{1}{2}}-43643_{0\frac{1}{2}}$	23
2742.465	3	*WA*	36452.763	$12097_{3\frac{1}{2}}-48549°_{4\frac{1}{2}}$	49	2768.337	6	*WA*	36112.104	$0°_{3\frac{1}{2}}-36112_{3\frac{1}{2}}$	84
2744.540	5	*WA*	36425.204	$8169°_{1\frac{1}{2}}-44594_{2\frac{1}{2}}$	−25	2768.522	5	*WA*	36109.691		
2745.007	5	*WA*	36419.008	$8175°_{2\frac{1}{2}}-44594_{2\frac{1}{2}}$	−56	2769.275	4	*WA*	36099.873	$1873°_{3\frac{1}{2}}-37973_{3\frac{1}{2}}$	32
2745.723	60	*WA*	36409.511	$11742°_{5\frac{1}{2}}-48151_{4\frac{1}{2}}$	18	2769.995	1	*WA*	36090.491	$13527_{4\frac{1}{2}}-49617°_{5\frac{1}{2}}$	30
2746.562	2	*WA*	36398.389	$4459°_{3\frac{1}{2}}-40858_{4\frac{1}{2}}$	57	2770.613	3	*WA*	36082.441	$14481°_{2\frac{1}{2}}-50564_{2\frac{1}{2}}$	67
2746.654	6	*WA*	36397.171	$12260°_{3\frac{1}{2}}-48657_{3\frac{1}{2}}$	−76	2770.993	2	*WA*	36077.493	$13012°_{2\frac{1}{2}}-49089_{2\frac{1}{2}}$	102
2748.021	4	*WA*	36379.066	$4910°_{5\frac{1}{2}}-41289_{5\frac{1}{2}}$	58	2771.148	8	*WA*	36075.475	$11949°_{3\frac{1}{2}}-48024_{2\frac{1}{2}}$	−10
2749.705	3	*WA*	36356.787			2771.660	1	*WA*	36068.811	$5964°_{3\frac{1}{2}}-42033_{2\frac{1}{2}}$	53
2749.954	3	*WA*	36353.495			2772.326	5	*WA*	36060.147	$13027_{6\frac{1}{2}}-49087°_{7\frac{1}{2}}$	25
2750.451	4	*WA*	36346.927	$3508°_{0\frac{1}{2}}-39855_{0\frac{1}{2}}$	−1	2772.927	4	*WA*	36052.332	$8896_{5\frac{1}{2}}-44949°_{4\frac{1}{2}}$	50
2750.894	80	*WA*	36341.074	$5651°_{5\frac{1}{2}}-41992_{6\frac{1}{2}}$	75	2773.022	4	*WA*	36051.096	$10646_{5\frac{1}{2}}-46697°_{4\frac{1}{2}}$	83
2751.334	1	*WA*	36335.263	$7746°_{2\frac{1}{2}}-44081_{1\frac{1}{2}}$	73	2774.516	1	*WA*	36031.685	$3363°_{2\frac{1}{2}}-39394_{3\frac{1}{2}}$	123
2752.679	3	*WA*	36317.510	$5716°_{3\frac{1}{2}}-42033_{2\frac{1}{2}}$	71	2775.158	8	*WA*	36023.350	$5969°_{5\frac{1}{2}}-41992_{6\frac{1}{2}}$	2
2752.945	4	*WA*	36314.000	$8280°_{2\frac{1}{2}}-44594_{2\frac{1}{2}}$	19	2776.961	3	*WA*	35999.962	$4511°_{2\frac{1}{2}}-40511_{1\frac{1}{2}}$	93
2753.073	5	*WA*	36312.312	$2140°_{0\frac{1}{2}}-38452_{1\frac{1}{2}}$	55	2778.537	1	*WA*	35979.544	$11007°_{1\frac{1}{2}}-46987_{1\frac{1}{2}}$	−24
2753.210	3	*WA*	36310.505			2778.887	2	*WA*	35975.013	$8448_{2\frac{1}{2}}-44423°_{1\frac{1}{2}}$	79
2753.302	4	*WA*	36309.292	$4201°_{1\frac{1}{2}}-40511_{1\frac{1}{2}}$	59	2779.464	4	*WA*	35967.545	$12057°_{2\frac{1}{2}}-48024_{2\frac{1}{2}}$	−22
2753.541	4	*WA*	36306.141	$5283°_{0\frac{1}{2}}-41589_{0\frac{1}{2}}$	35	2779.825	4	*WA*	35962.874		
2753.764	2	*WA*	36303.201	$2634°_{2\frac{1}{2}}-38937_{1\frac{1}{2}}$	51	2780.000	40	*WA*	35960.610	$2581°_{4\frac{1}{2}}-38541_{4\frac{1}{2}}$	−5
2754.232	4	*WA*	36297.033			2781.032	7	*WA*	35947.267	$4910°_{5\frac{1}{2}}-40858_{4\frac{1}{2}}$	25
2754.653	1	*WA*	36291.486	$12365°_{4\frac{1}{2}}-48657_{3\frac{1}{2}}$	−43	2781.431	6	*WA*	35942.110	$10646_{5\frac{1}{2}}-46588°_{5\frac{1}{2}}$	50
2755.082	3	*WA*	36285.835			2781.797	2	*WA*	35937.382	$6521°_{1\frac{1}{2}}-42458_{1\frac{1}{2}}$	−28
2755.413	6	*WA*	36281.476	$9316_{3\frac{1}{2}}-45598°_{3\frac{1}{2}}$	88	2781.894	30	*WA*	35936.128	$987°_{4\frac{1}{2}}-36923_{4\frac{1}{2}}$	−49
2755.681	2	*WA*	36277.948	$3593°_{4\frac{1}{2}}-39871_{4\frac{1}{2}}$	−2	2781.986	30	*WA*	35934.940	$6638°_{4\frac{1}{2}}-42573_{3\frac{1}{2}}$	8
2755.962	3	*WA*	36274.249			2782.101	2	*WA*	35933.455	$2595°_{1\frac{1}{2}}-38529_{2\frac{1}{2}}$	79
2756.086	4	*WA*	36272.617	$7061°_{0\frac{1}{2}}-43334_{0\frac{1}{2}}$	123	2782.699	3	*WA*	35925.733	$0°_{3\frac{1}{2}}-35925_{3\frac{1}{2}}$	52
2756.798	30	*WA*	36263.249	$7818°_{1\frac{1}{2}}-44081_{1\frac{1}{2}}$	22	2783.786	5	*WA*	35911.706	$8169°_{1\frac{1}{2}}-44081_{1\frac{1}{2}}$	29
2758.790	1	*WA*	36237.066	$2595°_{1\frac{1}{2}}-38832_{2\frac{1}{2}}$	2	2784.007	3	*WA*	35908.855	$6549°_{2\frac{1}{2}}-42458_{1\frac{1}{2}}$	21
2759.054	4	*WA*	36233.600	$12097_{3\frac{1}{2}}-48330°_{3\frac{1}{2}}$	86	2784.271	100	*MT*	35905.451	$8175°_{2\frac{1}{2}}-44081_{1\frac{1}{2}}$	−60
2760.271	5	*WA*	36217.625			2784.664	3	*WA*	35900.383	$2641°_{3\frac{1}{2}}-38541_{4\frac{1}{2}}$	70

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
2785.049	2	WA	35895.421	$9053_{3\frac{1}{2}} - 44949^{\circ}_{4\frac{1}{2}}$	39	2811.457	2	WA	35558.272	$12466^{\circ}_{1\frac{1}{2}} - 48024_{2\frac{1}{2}}$	28
2785.125	5	WA	35894.441	$2634^{\circ}_{2\frac{1}{2}} - 38529_{2\frac{1}{2}}$	87	2811.859	25	WA	35553.189	$2581^{\circ}_{4\frac{1}{2}} - 38134_{4\frac{1}{2}}$	46
2785.347	80	MT	35891.581	$12260^{\circ}_{3\frac{1}{2}} - 48151_{4\frac{1}{2}}$	−69	2812.893	8	WA	35540.121	$11949^{\circ}_{3\frac{1}{2}} - 47489_{3\frac{1}{2}}$	30
2785.664	1	WA	35887.497	$2641^{\circ}_{3\frac{1}{2}} - 38529_{2\frac{1}{2}}$	35	2814.777	30	WA	35516.334		
2786.520	2	WA	35876.473	$3995^{\circ}_{3\frac{1}{2}} - 39871_{4\frac{1}{2}}$	100	2814.811	40	MT	35515.905		
2786.688	3	WA	35874.310			2814.951	50	WA	35514.139	$7059^{\circ}_{4\frac{1}{2}} - 42573_{3\frac{1}{2}}$	20
2787.650	3	WA	35861.931	$8789_{2\frac{1}{2}} - 44651^{\circ}_{1\frac{1}{2}}$	8	2814.997	4	WA	35513.558	$1410^{\circ}_{4\frac{1}{2}} - 36923_{4\frac{1}{2}}$	74
2788.022	3	WA	35857.146	$2595^{\circ}_{1\frac{1}{2}} - 38452_{1\frac{1}{2}}$	40	2816.052	3	WA	35500.254	$5010^{\circ}_{2\frac{1}{2}} - 40511_{1\frac{1}{2}}$	−2
2788.689	7	WA	35848.570	$10314_{4\frac{1}{2}} - 46162^{\circ}_{4\frac{1}{2}}$	41	2816.629	3	WA	35492.982		
2789.328	2	WA	35840.358	$9053_{3\frac{1}{2}} - 44893^{\circ}_{3\frac{1}{2}}$	48	2817.364	4	WA	35483.723	$6549^{\circ}_{2\frac{1}{2}} - 42033_{2\frac{1}{2}}$	−23
2790.517	80	WA	35825.088	$7818^{\circ}_{1\frac{1}{2}} - 43643_{0\frac{1}{2}}$	5	2817.490	50	WA	35482.137	$5716^{\circ}_{3\frac{1}{2}} - 41198_{2\frac{1}{2}}$	44
2790.593	3	WA	35824.112	$5924^{\circ}_{1\frac{1}{2}} - 41748_{1\frac{1}{2}}$	38	2818.029	2	WA	35475.350	$2140^{\circ}_{0\frac{1}{2}} - 37615_{0\frac{1}{2}}$	109
2791.053	2	WA	35818.208	$2634^{\circ}_{2\frac{1}{2}} - 38452_{1\frac{1}{2}}$	124	2818.173	4	WA	35473.538	$8169^{\circ}_{1\frac{1}{2}} - 43643_{0\frac{1}{2}}$	6
2791.408	110	WA	35813.653	$9316_{3\frac{1}{2}} - 45130^{\circ}_{2\frac{1}{2}}$	37	2818.376	6	WA	35470.983	$5819^{\circ}_{4\frac{1}{2}} - 41289_{5\frac{1}{2}}$	125
2791.787	3	WA	35808.792			2819.253	4	WA	35459.949		
2791.876	2	WA	35807.650	$0^{\circ}_{3\frac{1}{2}} - 35807_{4\frac{1}{2}}$	82	2820.060	3	WA	35449.802		
2792.380	4	WA	35801.187	$3593^{\circ}_{4\frac{1}{2}} - 39394_{3\frac{1}{2}}$	80	2820.744	5	WA	35441.207		
2792.439	5	WA	35800.431	$8280^{\circ}_{2\frac{1}{2}} - 44081_{1\frac{1}{2}}$	3	2820.858	4	WA	35439.774		
2792.884	4	WA	35794.727			2821.473	6	WA	35432.050	$13117_{4\frac{1}{2}} - 48549^{\circ}_{4\frac{1}{2}}$	−17
2793.568	5	WA	35785.963	$12365^{\circ}_{4\frac{1}{2}} - 48151_{4\frac{1}{2}}$	31	2821.682	5	WA	35429.425	$3508^{\circ}_{0\frac{1}{2}} - 38937_{1\frac{1}{2}}$	84
2794.519	2	WA	35773.785	$4737^{\circ}_{2\frac{1}{2}} - 40511_{1\frac{1}{2}}$	32	2822.366	5	WA	35420.840	$5437^{\circ}_{3\frac{1}{2}} - 40858_{4\frac{1}{2}}$	57
2795.236	3	WA	35764.610	$12260^{\circ}_{3\frac{1}{2}} - 48024_{2\frac{1}{2}}$	23	2822.548	3	WA	35418.556		
2795.384	3	WA	35762.716	$4910^{\circ}_{5\frac{1}{2}} - 40673_{5\frac{1}{2}}$	105	2823.421	6	WA	35407.605	$5675^{\circ}_{4\frac{1}{2}} - 41083_{4\frac{1}{2}}$	74
2795.945	3	WA	35755.541	$2382^{\circ}_{4\frac{1}{2}} - 38137_{5\frac{1}{2}}$	105	2823.629	3	WA	35404.997		
2796.206	2	WA	35752.204	$2382^{\circ}_{4\frac{1}{2}} - 38134_{4\frac{1}{2}}$	50	2824.030	7	WA	35399.970	$12751^{\circ}_{5\frac{1}{2}} - 48151_{4\frac{1}{2}}$	13
2797.627	5	WA	35734.045			2824.276	1	WA	35396.886	$7061^{\circ}_{0\frac{1}{2}} - 42458_{1\frac{1}{2}}$	−18
2799.155	5	WA	35714.540	$1873^{\circ}_{3\frac{1}{2}} - 37588_{3\frac{1}{2}}$	1	2824.629	4	WA	35392.463	$2581^{\circ}_{4\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−55
2800.963	1	WA	35691.487	$3703^{\circ}_{3\frac{1}{2}} - 39394_{3\frac{1}{2}}$	92	2824.880	7	WA	35389.318	$2581^{\circ}_{4\frac{1}{2}} - 37970_{5\frac{1}{2}}$	44
2801.196	4	WA	35688.519			2825.296	3	WA	35384.108	$3508^{\circ}_{0\frac{1}{2}} - 38892_{0\frac{1}{2}}$	77
2801.485	3	WA	35684.837			2825.715	4	WA	35378.861	$8702^{\circ}_{1\frac{1}{2}} - 44081_{1\frac{1}{2}}$	−69
2801.747	3	WA	35681.500	$11015_{3\frac{1}{2}} - 46697^{\circ}_{4\frac{1}{2}}$	−4	2826.499	5	WA	35369.049	$5716^{\circ}_{3\frac{1}{2}} - 41085_{3\frac{1}{2}}$	51
2803.042	35	WA	35665.016	$5924^{\circ}_{1\frac{1}{2}} - 41589_{0\frac{1}{2}}$	101	2826.647	3	WA	35367.197	$5716^{\circ}_{3\frac{1}{2}} - 41083_{4\frac{1}{2}}$	119
2803.121	3	WA	35664.011	$2140^{\circ}_{0\frac{1}{2}} - 37804_{1\frac{1}{2}}$	70	2828.039	8	WA	35349.789	$7818^{\circ}_{1\frac{1}{2}} - 43167_{1\frac{1}{2}}$	57
2803.256	1	WA	35662.294	$2879^{\circ}_{5\frac{1}{2}} - 38541_{4\frac{1}{2}}$	116	2828.703	5	WA	35341.492	$14276_{5\frac{1}{2}} - 49617^{\circ}_{5\frac{1}{2}}$	90
2803.943	5	WA	35653.557	$4201^{\circ}_{1\frac{1}{2}} - 39855_{0\frac{1}{2}}$	51	2829.247	4	WA	35334.697		
2804.389	5	WA	35647.887	$5437^{\circ}_{3\frac{1}{2}} - 41085_{3\frac{1}{2}}$	101	2829.556	5	WA	35330.838	$13758^{\circ}_{1\frac{1}{2}} - 49089_{2\frac{1}{2}}$	23
2804.590	2	WA	35645.332	$13012^{\circ}_{2\frac{1}{2}} - 48657_{3\frac{1}{2}}$	92	2829.618	4	WA	35330.064		
				$7522^{\circ}_{0\frac{1}{2}} - 43167_{1\frac{1}{2}}$	−87	2830.244	2	WA	35322.250	$1873^{\circ}_{3\frac{1}{2}} - 37196_{4\frac{1}{2}}$	46
2804.814	3	WA	35642.485	$7818^{\circ}_{1\frac{1}{2}} - 43460_{2\frac{1}{2}}$	100	2830.341	4	WA	35321.040	$5969^{\circ}_{5\frac{1}{2}} - 41289_{5\frac{1}{2}}$	76
2805.113	4	WA	35638.686	$5651^{\circ}_{5\frac{1}{2}} - 41289_{5\frac{1}{2}}$	73	2830.895	220	WA	35314.128	$7259^{\circ}_{3\frac{1}{2}} - 42573_{3\frac{1}{2}}$	13
2805.457	4	WA	35634.317	$8789_{2\frac{1}{2}} - 44423^{\circ}_{1\frac{1}{2}}$	122	2831.647	4	WA	35304.750	$13784^{\circ}_{1\frac{1}{2}} - 49089_{2\frac{1}{2}}$	98
2805.624	3	WA	35632.196	$9316_{3\frac{1}{2}} - 44949^{\circ}_{4\frac{1}{2}}$	97	2832.568	3	WA	35293.271	$10869_{4\frac{1}{2}} - 46162^{\circ}_{4\frac{1}{2}}$	121
2806.711	5	WA	35618.397	$13012^{\circ}_{2\frac{1}{2}} - 48630_{1\frac{1}{2}}$	35	2832.928	3	WA	35288.786		
2807.038	6	WA	35614.248	$5675^{\circ}_{4\frac{1}{2}} - 41289_{5\frac{1}{2}}$	40	2833.274	80	WA	35284.477		
2807.674	5	WA	35606.180	$15565^{\circ}_{2\frac{1}{2}} - 51171_{3\frac{1}{2}}$	10	2833.580	3	WA	35280.667		
2808.360	4	WA	35597.484			2834.099	3	WA	35274.207	$5924^{\circ}_{1\frac{1}{2}} - 41198_{2\frac{1}{2}}$	102
2808.823	3	WA	35591.616	$2382^{\circ}_{4\frac{1}{2}} - 37973_{3\frac{1}{2}}$	91	2834.744	6	WA	35266.181	$5819^{\circ}_{4\frac{1}{2}} - 41085_{3\frac{1}{2}}$	87
2809.560	8	MT	35582.280	$7878^{\circ}_{3\frac{1}{2}} - 43460_{2\frac{1}{2}}$	76	2834.902	4	WA	35264.215	$5819^{\circ}_{4\frac{1}{2}} - 41083_{4\frac{1}{2}}$	35
2810.177	30	WA	35574.468	$2563^{\circ}_{5\frac{1}{2}} - 38137_{5\frac{1}{2}}$	19	2835.393	3	WA	35258.109	$2879^{\circ}_{5\frac{1}{2}} - 38137_{5\frac{1}{2}}$	123
2811.419	5	WA	35558.753	$0^{\circ}_{3\frac{1}{2}} - 35558_{3\frac{1}{2}}$	51	2835.601	35	WA	35255.523	$5942^{\circ}_{3\frac{1}{2}} - 41198_{2\frac{1}{2}}$	13

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
2837.598	6	*WA*	35230.713	$6517°_{2\frac{1}{2}}-41748_{1\frac{1}{2}}$	53	2856.307	1	*WA*	34999.960	$12466°_{1\frac{1}{2}}-47466_{2\frac{1}{2}}$	−54
2837.896	14	*WA*	35227.013	$6521°_{1\frac{1}{2}}-41748_{1\frac{1}{2}}$	67	2856.394	6	*WA*	34998.894	$15565°_{2\frac{1}{2}}-50564_{2\frac{1}{2}}$	11
2838.004	10	*PK*	35225.673	$0°_{3\frac{1}{2}}-35225_{2\frac{1}{2}}$	17	2856.473	5	*WA*	34997.926	$13659°_{4\frac{1}{2}}-48657_{3\frac{1}{2}}$	−80
2838.810	4	*WA*	35215.672	$3593°_{4\frac{1}{2}}-38809_{3\frac{1}{2}}$	78	2856.674	3	*WA*	34995.464	$10869_{4\frac{1}{2}}-45864°_{5\frac{1}{2}}$	55
2838.857	2	*MT*	35215.089			2856.831	4	*WA*	34993.541		
2838.945	4	*WA*	35213.997	$2634°_{2\frac{1}{2}}-37848_{2\frac{1}{2}}$	114	2856.937	5	*WA*	34992.242	$14625_{5\frac{1}{2}}-49617°_{5\frac{1}{2}}$	46
2839.030	4	*WA*	35212.943	$13117_{4\frac{1}{2}}-48330°_{3\frac{1}{2}}$	76	2856.976	4	*WA*	34991.765	$14276_{5\frac{1}{2}}-49267°_{4\frac{1}{2}}$	82
2839.364	30	*MT*	35208.801	$2595°_{1\frac{1}{2}}-37804_{1\frac{1}{2}}$	12	2858.009	60	*WA*	34979.118	$16192°_{4\frac{1}{2}}-51171_{3\frac{1}{2}}$	−6
2839.523	4	*WA*	35206.830	$5651°_{5\frac{1}{2}}-40858_{4\frac{1}{2}}$	−17	2858.472	4	*WA*	34973.453	$12456_{3\frac{1}{2}}-47430°_{3\frac{1}{2}}$	15
2839.561	5	*WA*	35206.359	$12260°_{3\frac{1}{2}}-47466_{2\frac{1}{2}}$	2	2858.716	3	*WA*	34970.468	$1873°_{3\frac{1}{2}}-36844_{2\frac{1}{2}}$	97
2840.205	3	*WA*	35198.376	$6549°_{2\frac{1}{2}}-41748_{1\frac{1}{2}}$	6	2859.062	6	*WA*	34966.236		
2840.686	5	*WA*	35192.416	$3745°_{1\frac{1}{2}}-38937_{1\frac{1}{2}}$	80	2859.516	30	*WA*	34960.685	$9634°_{1\frac{1}{2}}-44594_{2\frac{1}{2}}$	−56
2841.486	6	*WA*	35182.509	$5675°_{4\frac{1}{2}}-40858_{4\frac{1}{2}}$	67	2860.555	4	*WA*	34947.987	$3593°_{4\frac{1}{2}}-38541_{4\frac{1}{2}}$	−3
2841.719	18	*PK*	35179.624	$8280°_{2\frac{1}{2}}-43460_{2\frac{1}{2}}$	38	2860.643	3	*WA*	34946.912	$2641°_{3\frac{1}{2}}-37588_{3\frac{1}{2}}$	−1
2842.075	3	*WA*	35175.218			2860.864	4	*WA*	34944.213	$3508°_{0\frac{1}{2}}-38452_{1\frac{1}{2}}$	−66
2842.513	25	*WA*	35169.798	$2634°_{2\frac{1}{2}}-37804_{1\frac{1}{2}}$	31	2861.169	5	*WA*	34940.487		
2842.830	18	*WA*	35165.877			2861.345	18	*WA*	34938.338	$2140°_{0\frac{1}{2}}-37078_{1\frac{1}{2}}$	−48
2842.924	3	*WA*	35164.714	$8169°_{1\frac{1}{2}}-43334_{0\frac{1}{2}}$	80	2861.621	35	*WA*	34934.969	$2595°_{1\frac{1}{2}}-37530_{1\frac{1}{2}}$	−19
2844.311	6	*WA*	35147.567			2862.785	40	*MT*	34920.765	$0°_{3\frac{1}{2}}-34920_{3\frac{1}{2}}$	−22
2844.727	4	*WA*	35142.427	$5942°_{3\frac{1}{2}}-41085_{3\frac{1}{2}}$	12	2863.225	4	*WA*	34915.399	$5942°_{3\frac{1}{2}}-40858_{4\frac{1}{2}}$	−7
2844.760	3	*WA*	35142.020	$5716°_{3\frac{1}{2}}-40858_{4\frac{1}{2}}$	31	2864.484	5	*WA*	34900.053	$6389°_{4\frac{1}{2}}-41289_{5\frac{1}{2}}$	25
2844.805	1	*WA*	35141.464	$13515°_{3\frac{1}{2}}-48657_{3\frac{1}{2}}$	−18	2864.819	4	*WA*	34895.973	$2634°_{2\frac{1}{2}}-37530_{1\frac{1}{2}}$	6
2844.882	4	*WA*	35140.513	$5942°_{3\frac{1}{2}}-41083_{4\frac{1}{2}}$	17	2864.894	3	*WA*	34895.059	$10703_{4\frac{1}{2}}-45598°_{3\frac{1}{2}}$	64
2845.357	4	*WA*	35134.647			2865.378	7	*WA*	34889.165	$5969°_{5\frac{1}{2}}-40858_{4\frac{1}{2}}$	−32
2845.452	30	*WA*	35133.474	$11454_{6\frac{1}{2}}-46588°_{5\frac{1}{2}}$	44	2865.513	8	*WA*	34887.522		
2845.751	8	*WA*	35129.782	$11458_{5\frac{1}{2}}-46588°_{5\frac{1}{2}}$	5	2865.563	3	*WA*	34886.913	$8280°_{2\frac{1}{2}}-43167_{1\frac{1}{2}}$	−20
2845.805	3	*WA*	35129.116	$3703°_{3\frac{1}{2}}-38832_{2\frac{1}{2}}$	1	2866.057	5	*WA*	34880.900	$14387_{4\frac{1}{2}}-49267°_{4\frac{1}{2}}$	30
2846.265	5	*WA*	35123.439	$12365°_{4\frac{1}{2}}-47489_{3\frac{1}{2}}$	−34	2866.809	30	*WA*	34871.751	$13758°_{1\frac{1}{2}}-48630_{1\frac{1}{2}}$	−35
2846.363	4	*WA*	35122.229			2867.273	4	*WA*	34866.108		
2846.513	1	*WA*	35120.379	$5964°_{3\frac{1}{2}}-41085_{3\frac{1}{2}}$	61	2867.766	1	*WA*	34860.114	$7713°_{4\frac{1}{2}}-42573_{3\frac{1}{2}}$	13
2847.005	3	*WA*	35114.310	$5969°_{5\frac{1}{2}}-41083_{4\frac{1}{2}}$	23	2868.230	6	*WA*	34854.475	$5819°_{4\frac{1}{2}}-40673_{5\frac{1}{2}}$	14
2847.124	4	*WA*	35112.842	$13217_{3\frac{1}{2}}-48330°_{3\frac{1}{2}}$	29	2868.960	7	*WA*	34845.607	$13784°_{1\frac{1}{2}}-48630_{1\frac{1}{2}}$	−15
2847.236	6	*WA*	35111.461			2869.559	3	*WA*	34838.334	$3703°_{3\frac{1}{2}}-38541_{4\frac{1}{2}}$	55
2847.689	3	*WA*	35105.876	$3703°_{3\frac{1}{2}}-38809_{3\frac{1}{2}}$	−5	2869.647	4	*WA*	34837.265	$3995°_{3\frac{1}{2}}-38832_{2\frac{1}{2}}$	17
2848.079	4	*WA*	35101.069	$4737°_{2\frac{1}{2}}-39838_{2\frac{1}{2}}$	−2	2870.150	1	*WA*	34831.160	$7202°_{2\frac{1}{2}}-42033_{2\frac{1}{2}}$	35
2848.819	3	*WA*	35091.952	$2140°_{0\frac{1}{2}}-37232_{1\frac{1}{2}}$	6	2870.500	3	*WA*	34826.913	$7746°_{2\frac{1}{2}}-42573_{3\frac{1}{2}}$	−92
2848.909	3	*WA*	35090.843	$2879°_{5\frac{1}{2}}-37970_{5\frac{1}{2}}$	7	2870.624	7	*WA*	34825.409	$3703°_{3\frac{1}{2}}-38529_{2\frac{1}{2}}$	−17
2849.033	35	*WA*	35089.316	$3363°_{2\frac{1}{2}}-38452_{1\frac{1}{2}}$	−6	2871.073	35	*WA*	34819.963	$987°_{4\frac{1}{2}}-35807_{4\frac{1}{2}}$	7
2849.198	4	*WA*	35087.284	$3745°_{1\frac{1}{2}}-38832_{2\frac{1}{2}}$	51	2871.401	1	*WA*	34815.986	$9778°_{2\frac{1}{2}}-44594_{2\frac{1}{2}}$	44
2850.784	1	*WA*	35067.765	$6521°_{1\frac{1}{2}}-41589_{0\frac{1}{2}}$	−37	2871.573	6	*PK*	34813.901	$2382°_{4\frac{1}{2}}-37196_{4\frac{1}{2}}$	8
2851.598	4	*WA*	35057.755	$8402°_{3\frac{1}{2}}-43460_{2\frac{1}{2}}$	−109	2871.633	20	*WA*	34813.173	$0°_{3\frac{1}{2}}-34813_{2\frac{1}{2}}$	−28
2851.700	3	*WA*	35056.501	$2595°_{1\frac{1}{2}}-37652_{2\frac{1}{2}}$	54	2871.763	1	*WA*	34811.597	$9269°_{0\frac{1}{2}}-44081_{1\frac{1}{2}}$	49
2852.237	3	*WA*	35049.901	$1873°_{3\frac{1}{2}}-36923_{4\frac{1}{2}}$	47	2872.435	3	*WA*	34803.454	$13527_{4\frac{1}{2}}-48330°_{3\frac{1}{2}}$	−96
2854.491	5	*WA*	35022.226	$5651°_{5\frac{1}{2}}-40673_{5\frac{1}{2}}$	8	2872.481	5	*WA*	34802.896	$15565°_{2\frac{1}{2}}-50368_{3\frac{1}{2}}$	−28
2854.667	70	*MT*	35020.067	$2595°_{1\frac{1}{2}}-37615_{0\frac{1}{2}}$	−22	2873.354	3	*WA*	34792.323	$1410°_{4\frac{1}{2}}-36202_{4\frac{1}{2}}$	70
2854.880	70	*WA*	35017.454	$2634°_{2\frac{1}{2}}-37652_{2\frac{1}{2}}$	29	2874.135	200	*WA*	34782.869		
2855.321	35	*MT*	35012.046	$16159°_{3\frac{1}{2}}-51171_{3\frac{1}{2}}$	−8	2874.551	4	*WA*	34777.836	$10820_{2\frac{1}{2}}-45598°_{3\frac{1}{2}}$	21
2855.443	35	*WA*	35010.550	$2641°_{3\frac{1}{2}}-37652_{2\frac{1}{2}}$	19	2874.821	4	*WA*	34774.570	$7259°_{3\frac{1}{2}}-42033_{2\frac{1}{2}}$	−9
2855.718	35	*WA*	35007.179	$2581°_{4\frac{1}{2}}-37588_{3\frac{1}{2}}$	−36	2874.917	4	*WA*	34773.408		
2856.046	5	*WA*	35003.159	$12456_{3\frac{1}{2}}-47459°_{2\frac{1}{2}}$	11	2875.899	1	*WA*	34761.535	$3508°_{0\frac{1}{2}}-38269_{0\frac{1}{2}}$	32

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
2876.183	3	*WA*	34758.103	$8702°_{1\,1/2}-43460_{2\,1/2}$	15	2899.089	3	*WA*	34483.488		
2877.120	2	*WA*	34746.784	$2595°_{1\,1/2}-37342_{2\,1/2}$	101	2899.446	5	*WA*	34479.243		
2878.018	3	*WA*	34735.942	$4201°_{1\,1/2}-38937_{1\,1/2}$	20	2899.620	4	*WA*	34477.174	$13012°_{2\,1/2}-47489_{3\,1/2}$	−10
2878.635	6	*WA*	34728.497	$987°_{4\,1/2}-35716_{5\,1/2}$	26	2900.368	6	*WA*	34468.282	$6389°_{4\,1/2}-40858_{4\,1/2}$	20
2878.786	4	*WA*	34726.676	$12762°_{4\,1/2}-47489_{3\,1/2}$	37	2900.606	5	*WA*	34465.455	$8702°_{1\,1/2}-43167_{1\,1/2}$	19
2879.366	3	*WA*	34719.681	$5118°_{2\,1/2}-39838_{2\,1/2}$	43	2901.545	4	*WA*	34454.301	$13012°_{2\,1/2}-47466_{2\,1/2}$	−48
2879.949	2	*WA*	34712.653	$7746°_{2\,1/2}-42458_{1\,1/2}$	96	2901.708	3	*WA*	34452.366	$14097_{3\,1/2}-48549°_{4\,1/2}$	70
2880.356	5	*WA*	34707.749	$2634°_{2\,1/2}-37342_{2\,1/2}$	88	2902.147	7	*WA*	34447.155	$9634°_{1\,1/2}-44081_{1\,1/2}$	−33
2880.637	60	*MT*	34704.363	$11458_{5\,1/2}-46162°_{4\,1/2}$	24	2902.323	4	*WA*	34445.066	$6638°_{4\,1/2}-41083_{4\,1/2}$	30
2880.849	2	*WA*	34701.809	$1410°_{4\,1/2}-36112_{3\,1/2}$	93	2902.385	3	*WA*	34444.330	$2634°_{2\,1/2}-37078_{1\,1/2}$	117
2880.928	3	*WA*	34700.857	$2641°_{3\,1/2}-37342_{2\,1/2}$	90	2902.664	5	*WA*	34441.019	$3363°_{2\,1/2}-37804_{1\,1/2}$	13
2881.129	30	*WA*	34698.437	$7293°_{6\,1/2}-41992_{6\,1/2}$	19	2902.715	4	*WA*	34440.414	$14827_{3\,1/2}-49267°_{4\,1/2}$	56
2881.393	3	*WA*	34695.258	$6389°_{4\,1/2}-41085_{3\,1/2}$	−13	2903.519	3	*WA*	34430.878	$3703°_{3\,1/2}-38134_{4\,1/2}$	72
2881.420	4	*WA*	34694.933	$7878°_{3\,1/2}-42573_{3\,1/2}$	70	2903.746	3	*WA*	34428.186		
2881.772	3	*WA*	34690.695	$4201°_{1\,1/2}-38892_{0\,1/2}$	87	2905.250	3	*WA*	34410.364	$11454_{6\,1/2}-45864°_{5\,1/2}$	116
2882.605	60	*WA*	34680.671	$6517°_{2\,1/2}-41198_{2\,1/2}$	−18	2905.849	2	*WA*	34403.272	$11759_{5\,1/2}-46162°_{4\,1/2}$	47
2882.909	2	*WA*	34677.014	$6521°_{1\,1/2}-41198_{2\,1/2}$	37	2906.032	4	*WA*	34401.105	$5437°_{3\,1/2}-39838_{2\,1/2}$	83
2884.729	4	*WA*	34655.137	$13675_{2\,1/2}-48330°_{3\,1/2}$	69	2906.088	5	*WA*	34400.443		
2885.010	5	*WA*	34651.762	$6638°_{4\,1/2}-41289_{5\,1/2}$	49	2907.462	3	*WA*	34384.186	$5010°_{2\,1/2}-39394_{3\,1/2}$	64
2885.289	40	*WA*	34648.411	$6549°_{2\,1/2}-41198_{2\,1/2}$	11	2907.524	3	*WA*	34383.453		
2885.932	2	*WA*	34640.691	$7818°_{1\,1/2}-42458_{1\,1/2}$	96	2907.819	4	*WA*	34379.965	$3593°_{4\,1/2}-37973_{3\,1/2}$	71
2886.332	3	*MT*	34635.891	$13515°_{3\,1/2}-48151_{4\,1/2}$	6	2908.097	4	*WA*	34376.679	$3593°_{4\,1/2}-37970_{5\,1/2}$	29
2888.074	3	*WA*	34615.001	$2581°_{4\,1/2}-37196_{4\,1/2}$	121	2908.419	90	*PK*	34372.873	$4459°_{3\,1/2}-38832_{2\,1/2}$	36
				$4322°_{2\,1/2}-38937_{1\,1/2}$	−102	2909.452	1	*WA*	34360.669	$2563°_{5\,1/2}-36923_{4\,1/2}$	114
2888.456	7	*WA*	34610.423	$3363°_{2\,1/2}-37973_{3\,1/2}$	75	2909.614	5	*WA*	34358.756	$987°_{4\,1/2}-35346_{3\,1/2}$	86
2888.693	35	*WA*	34607.584	$14481°_{2\,1/2}-49089_{2\,1/2}$	28	2910.385	3	*WA*	34349.654	$4459°_{3\,1/2}-38809_{3\,1/2}$	51
2890.173	30	*WA*	34589.863	$9491°_{0\,1/2}-44081_{1\,1/2}$	−18	2910.852	4	*WA*	34344.144	$3793°_{6\,1/2}-38137_{5\,1/2}$	97
2890.409	2	*WA*	34587.039	$5924°_{1\,1/2}-40511_{1\,1/2}$	116	2911.120	4	*WA*	34340.982		
2891.636	3	*WA*	34572.363	$5283°_{0\,1/2}-39855_{0\,1/2}$	−6	2911.514	6	*WA*	34336.335		
2891.728	5	*WA*	34571.263			2912.287	2	*WA*	34327.222	$4201°_{1\,1/2}-38529_{2\,1/2}$	95
2892.032	14	*WA*	34567.630	$6517°_{2\,1/2}-41085_{3\,1/2}$	35	2912.769	10	*WA*	34321.542	$4511°_{2\,1/2}-38832_{2\,1/2}$	90
2892.140	14	*WA*	34566.339	$4266°_{3\,1/2}-38832_{2\,1/2}$	27	2912.903	25	*WA*	34319.963	$10274°_{3\,1/2}-44594_{2\,1/2}$	7
2893.863	2	*WA*	34545.759	$7202°_{2\,1/2}-41748_{1\,1/2}$	9	2913.195	5	*WA*	34316.523	$2879°_{5\,1/2}-37196_{4\,1/2}$	82
2894.019	6	*WA*	34543.897	$3593°_{4\,1/2}-38137_{5\,1/2}$	97	2913.362	7	*WA*	34314.556	$14315°_{0\,1/2}-48630_{1\,1/2}$	32
2894.086	40	*WA*	34543.097	$4266°_{3\,1/2}-38809_{3\,1/2}$	19	2913.528	8	*WA*	34312.601	$2581°_{4\,1/2}-36893_{3\,1/2}$	89
2894.216	50	*MT*	34541.545	$2382°_{4\,1/2}-36923_{4\,1/2}$	3	2913.738	5	*WA*	34310.128	$7278°_{1\,1/2}-41589_{0\,1/2}$	−69
2894.296	5	*WA*	34540.591	$3593°_{4\,1/2}-38134_{4\,1/2}$	73					$10820_{2\,1/2}-45130°_{2\,1/2}$	86
2894.732	4	*WA*	34535.389	$6549°_{2\,1/2}-41085_{3\,1/2}$	89	2914.105	3	*WA*	34305.807	$8423_{6\,1/2}-42729°_{5\,1/2}$	33
2894.881	5	*WA*	34533.611	$3995°_{3\,1/2}-38529_{2\,1/2}$	50					$1410°_{4\,1/2}-35716_{5\,1/2}$	29
2895.526	2	*WA*	34525.919	$5513_{5\,1/2}-40039°_{6\,1/2}$	104	2914.347	9	*WA*	34302.959	$10646_{5\,1/2}-44949°_{4\,1/2}$	19
2895.639	6	*WA*	34524.571	$3745°_{1\,1/2}-38269_{0\,1/2}$	73	2914.747	4	*WA*	34298.252	$4511°_{2\,1/2}-38809_{3\,1/2}$	33
2895.949	5	*WA*	34520.876	$12466°_{1\,1/2}-46987_{1\,1/2}$	−61	2914.933	2	*WA*	34296.063	$3508°_{0\,1/2}-37804_{1\,1/2}$	100
2896.404	8	*MT*	34515.453	$1410°_{4\,1/2}-35925_{3\,1/2}$	76	2915.252	4	*WA*	34292.311	$8280°_{2\,1/2}-42573_{3\,1/2}$	66
2896.733	70	*MT*	34511.533	$2382°_{4\,1/2}-36893_{3\,1/2}$	10	2915.408	3	*WA*	34290.476		
2896.862	5	*WA*	34509.997	$4322°_{2\,1/2}-38832_{2\,1/2}$	−3	2915.555	25	*WA*	34288.747	$3363°_{2\,1/2}-37652_{2\,1/2}$	83
2896.962	1	*WA*	34508.805	$13515°_{3\,1/2}-48024_{2\,1/2}$	−16	2915.747	4	*WA*	34286.489	$4523°_{4\,1/2}-38809_{3\,1/2}$	46
2897.172	4	*WA*	34506.304	$10088°_{1\,1/2}-44594_{2\,1/2}$	17	2916.046	2	*WA*	34282.974	$8175°_{2\,1/2}-42458_{1\,1/2}$	94
2898.336	7	*WA*	34492.447	$13659°_{4\,1/2}-48151_{4\,1/2}$	37	2916.682	35	*WA*	34275.498	$4266°_{3\,1/2}-38541_{4\,1/2}$	23
2898.944	6	*WA*	34485.213	$3363°_{2\,1/2}-37848_{2\,1/2}$	90	2916.826	2	*WA*	34273.806	$14276_{5\,1/2}-48549°_{4\,1/2}$	115
2899.073	4	*WA*	34483.679	$15134_{4\,1/2}-49617°_{5\,1/2}$	29	2917.127	4	*WA*	34270.270	$3703°_{3\,1/2}-37973_{3\,1/2}$	94

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
2917.491	5	*WA*	34265.994	$13758°_{1\,1/2}-48024_{2\,1/2}$	−10	2938.220	7	*WA*	34024.260	$7059°_{4\,1/2}-41083_{4\,1/2}$	39
2917.686	4	*WA*	34263.704	$1873°_{3\,1/2}-36137_{2\,1/2}$	35	2938.317	4	*WA*	34023.137	$13436_{2\,1/2}-47459°_{2\,1/2}$	102
2918.663	80	*WA*	34252.236	$2641°_{3\,1/2}-36893_{3\,1/2}$	25	2938.682	5	*WA*	34018.911	$4523°_{4\,1/2}-38541_{4\,1/2}$	72
2918.781	20	*WA*	34250.851	$4201°_{1\,1/2}-38452_{1\,1/2}$	−5	2939.538	30	*MT*	34009.006	$9634°_{1\,1/2}-43643_{0\,1/2}$	−37
2919.213	2	*WA*	34245.783	$10703_{4\,1/2}-44949°_{4\,1/2}$	77	2940.138	1	*WA*	34002.066	$7746°_{2\,1/2}-41748_{1\,1/2}$	−27
2919.539	1	*WA*	34241.959	$13217_{3\,1/2}-47459°_{2\,1/2}$	41	2940.663	7	*WA*	33995.996	$7293°_{6\,1/2}-41289_{5\,1/2}$	−36
2919.715	3	*WA*	34239.895	$13784°_{1\,1/2}-48024_{2\,1/2}$	54	2940.777	35	*WA*	33994.678	$3593°_{4\,1/2}-37588_{3\,1/2}$	87
2919.858	15	*WA*	34238.218			2940.877	6	*WA*	33993.522	$6517°_{2\,1/2}-40511_{1\,1/2}$	14
2920.292	5	*WA*	34233.130	$14097_{3\,1/2}-48330°_{3\,1/2}$	34	2941.197	5	*WA*	33989.824	$6521°_{1\,1/2}-40511_{1\,1/2}$	29
2920.482	10	*WA*	34230.903	$7059°_{4\,1/2}-41289_{5\,1/2}$	4	2942.132	3	*WA*	33979.022	$3363°_{2\,1/2}-37342_{2\,1/2}$	123
2920.926	3	*WA*	34225.700	$7522°_{0\,1/2}-41748_{1\,1/2}$	−120	2942.452	1	*WA*	33975.327	$13012°_{2\,1/2}-46987_{1\,1/2}$	54
2920.977	2	*WA*	34225.102	$3363°_{2\,1/2}-37588_{3\,1/2}$	57	2943.215	8	*WA*	33966.520	$10114°_{2\,1/2}-44081_{1\,1/2}$	28
2921.371	6	*WA*	34220.486	$5651°_{5\,1/2}-39871_{4\,1/2}$	11	2943.673	10	*WA*	33961.235	$6549°_{2\,1/2}-40511_{1\,1/2}$	16
2921.421	6	*WA*	34219.901	$6638°_{4\,1/2}-40858_{4\,1/2}$	−45	2943.987	7	*WA*	33957.613	$5437°_{3\,1/2}-39394_{3\,1/2}$	42
2922.080	10	*WA*	34212.184	$13217_{3\,1/2}-47430°_{3\,1/2}$	−23	2944.346	50	*WA*	33953.473	$10641°_{2\,1/2}-44594_{2\,1/2}$	−12
2922.244	3	*WA*	34210.264			2944.773	4	*WA*	33948.549	$3703°_{3\,1/2}-37652_{2\,1/2}$	53
2922.291	3	*WA*	34209.714	$2634°_{2\,1/2}-36844_{2\,1/2}$	75	2945.385	5	*WA*	33941.496	$4511°_{2\,1/2}-38452_{1\,1/2}$	3
2922.367	30	*WA*	34208.824	$16159°_{3\,1/2}-50368_{3\,1/2}$	15	2945.582	4	*WA*	33939.226	$7259°_{3\,1/2}-41198_{2\,1/2}$	−7
2922.581	20	*MT*	34206.319	$4322°_{2\,1/2}-38529_{2\,1/2}$	7	2945.856	3	*WA*	33936.070	$1410°_{4\,1/2}-35346_{3\,1/2}$	92
2922.880	5	*WA*	34202.820	$2641°_{3\,1/2}-36844_{2\,1/2}$	75	2946.056	8	*WA*	33933.766	$4203°_{6\,1/2}-38137_{5\,1/2}$	18
2923.076	3	*WA*	34200.527	$4737°_{2\,1/2}-38937_{1\,1/2}$	88	2946.101	3	*WA*	33933.248	$987°_{4\,1/2}-34920_{3\,1/2}$	71
2923.455	9	*WA*	34196.093	$5675°_{4\,1/2}-39871_{4\,1/2}$	24	2946.276	4	*WA*	33931.232	$5924°_{1\,1/2}-39855_{0\,1/2}$	37
2923.834	6	*WA*	34191.661	$13268_{2\,1/2}-47459°_{2\,1/2}$	−14	2946.373	9	*WA*	33930.115	$7818°_{1\,1/2}-41748_{1\,1/2}$	−16
2925.016	3	*WA*	34177.845	$8280°_{2\,1/2}-42458_{1\,1/2}$	48	2946.859	5	*WA*	33924.519	$14625_{5\,1/2}-48549°_{4\,1/2}$	33
2925.094	3	*WA*	34176.933	$3793°_{6\,1/2}-37970_{5\,1/2}$	36	2947.149	4	*WA*	33921.182	$2595°_{1\,1/2}-36516_{1\,1/2}$	28
2925.185	60	*MT*	34175.870	$16192°_{4\,1/2}-50368_{3\,1/2}$	−8	2947.304	2	*WA*	33919.398	$7278°_{1\,1/2}-41198_{2\,1/2}$	11
2925.641	8	*WA*	34170.544	$8402°_{3\,1/2}-42573_{3\,1/2}$	21	2947.742	4	*WA*	33914.358	$5924°_{1\,1/2}-39838_{2\,1/2}$	117
2925.925	8	*WA*	34167.227	$3363°_{2\,1/2}-37530_{1\,1/2}$	22	2948.385	8	*WA*	33906.962	$5964°_{3\,1/2}-39871_{4\,1/2}$	25
2926.293	3	*WA*	34162.930	$14387_{4\,1/2}-48549°_{4\,1/2}$	53	2948.735	5	*WA*	33902.938	$13527_{4\,1/2}-47430°_{3\,1/2}$	−6
2926.928	3	*WA*	34155.519	$5716°_{3\,1/2}-39871_{4\,1/2}$	−97	2948.857	9	*WA*	33901.535		
2927.249	5	*WA*	34151.774	$9491°_{0\,1/2}-43643_{0\,1/2}$	37	2949.195	3	*WA*	33897.650		
2927.548	5	*WA*	34148.286	$1410°_{4\,1/2}-35558_{3\,1/2}$	−111	2949.364	2	*WA*	33895.708	$5942°_{3\,1/2}-39838_{2\,1/2}$	61
				$2140°_{0\,1/2}-36288_{0\,1/2}$	117	2950.304	40	*WA*	33884.908	$3703°_{3\,1/2}-37588_{3\,1/2}$	30
2927.833	2	*WA*	34144.962	$3703°_{3\,1/2}-37848_{2\,1/2}$	6	2950.498	4	*WA*	33882.681	$7202°_{2\,1/2}-41085_{3\,1/2}$	−3
2927.864	4	*WA*	34144.601			2950.545	3	*WA*	33882.141	$2634°_{2\,1/2}-36516_{1\,1/2}$	9
2928.209	3	*WA*	34140.578	$10454°_{1\,1/2}-44594_{2\,1/2}$	−77	2951.291	10	*WA*	33873.577	$5964°_{3\,1/2}-39838_{2\,1/2}$	28
2928.874	4	*WA*	34132.827			2951.489	7	*WA*	33871.305	$17300°_{3\,1/2}-51171_{3\,1/2}$	24
2929.109	25	*WA*	34130.088	$4322°_{2\,1/2}-38452_{1\,1/2}$	47	2951.687	5	*WA*	33869.032	$3363°_{2\,1/2}-37232_{1\,1/2}$	22
2932.090	5	*WA*	34095.390	$4737°_{2\,1/2}-38832_{2\,1/2}$	55	2951.777	5	*WA*	33868.000	$4266°_{3\,1/2}-38134_{4\,1/2}$	−2
2932.274	10	*WA*	34093.251	$4844°_{1\,1/2}-38937_{1\,1/2}$	84	2952.124	3	*WA*	33864.019	$8169°_{1\,1/2}-42033_{2\,1/2}$	63
2932.459	3	*WA*	34091.100	$6967_{6\,1/2}-41058°_{7\,1/2}$	34	2952.667	1	*WA*	33857.792	$8175°_{2\,1/2}-42033_{2\,1/2}$	0
2933.529	6	*WA*	34078.666	$14252_{3\,1/2}-48330°_{3\,1/2}$	55	2953.076	5	*WA*	33853.103	$3995°_{3\,1/2}-37848_{2\,1/2}$	13
2934.088	3	*WA*	34072.174	$4737°_{2\,1/2}-38809_{3\,1/2}$	71	2954.409	4	*WA*	33837.829		
2934.345	20	*WA*	34069.190	$4459°_{3\,1/2}-38529_{2\,1/2}$	41	2955.100	5	*WA*	33829.917	$13659°_{4\,1/2}-47489_{3\,1/2}$	−33
2934.667	2	*WA*	34065.452	$12097_{3\,1/2}-46162°_{4\,1/2}$	36	2955.412	6	*WA*	33826.346	$9634°_{1\,1/2}-43460_{2\,1/2}$	0
2934.740	2	*WA*	34064.604	$9269°_{0\,1/2}-43334_{0\,1/2}$	99	2955.601	35	*WA*	33824.183	$7259°_{3\,1/2}-41083_{4\,1/2}$	−35
2935.757	4	*WA*	34052.804	$5819°_{4\,1/2}-39871_{4\,1/2}$	85	2955.807	6	*WA*	33821.825	$5010°_{2\,1/2}-38832_{2\,1/2}$	−13
2936.183	10	*WA*	34047.864	$4844°_{1\,1/2}-38892_{0\,1/2}$	8	2955.941	100	*MT*	33820.292	$2382°_{4\,1/2}-36202_{4\,1/2}$	−18
2937.257	1	*WA*	34035.415	$6638°_{4\,1/2}-40673_{5\,1/2}$	99	2956.707	25	*MT*	33811.531	$0°_{3\,1/2}-33811_{4\,1/2}$	−35
2938.051	7	*WA*	34026.217	$7059°_{4\,1/2}-41085_{3\,1/2}$	82	2956.987	3	*WA*	33808.329	$0°_{3\,1/2}-33808_{2\,1/2}$	13

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
2957.165	6	*WA*	33806.294	$15281_{6\,1/2} - 49087^{\circ}_{7\,1/2}$	17	2982.541	3	*WA*	33518.677	$1410^{\circ}_{4\,1/2} - 34928_{4\,1/2}$	12
2957.792	4	*WA*	33799.129	$7059^{\circ}_{4\,1/2} - 40858_{4\,1/2}$	−3	2982.966	4	*WA*	33513.902	$4459^{\circ}_{3\,1/2} - 37973_{3\,1/2}$	−1
2957.841	3	*WA*	33798.569	$5010^{\circ}_{2\,1/2} - 38809_{3\,1/2}$	−36	2983.271	1	*WA*	33510.476	$1410^{\circ}_{4\,1/2} - 34920_{3\,1/2}$	−7
2958.038	5	*WA*	33796.318	$10798^{\circ}_{2\,1/2} - 44594_{2\,1/2}$	−54	2983.918	10	*WA*	33503.210	$14827_{3\,1/2} - 48330^{\circ}_{3\,1/2}$	43
2958.440	3	*WA*	33791.726	$4737^{\circ}_{2\,1/2} - 38529_{2\,1/2}$	78	2984.106	4	*WA*	33501.099	$12097_{3\,1/2} - 45598^{\circ}_{3\,1/2}$	75
2959.105	40	*MT*	33784.132	$13675_{2\,1/2} - 47459^{\circ}_{2\,1/2}$	−39	2984.556	40	*WA*	33496.048	$2641^{\circ}_{3\,1/2} - 36137_{2\,1/2}$	3
2960.438	15	*WA*	33768.921	$8804^{\circ}_{4\,1/2} - 42573_{3\,1/2}$	−45	2984.713	6	*WA*	33494.287	$15593_{6\,1/2} - 49087^{\circ}_{7\,1/2}$	67
2960.640	6	*WA*	33766.617	$4203^{\circ}_{6\,1/2} - 37970_{5\,1/2}$	19	2984.866	4	*WA*	33492.570	$3703^{\circ}_{3\,1/2} - 37196_{4\,1/2}$	25
2961.367	4	*WA*	33758.327	$15859_{4\,1/2} - 49617^{\circ}_{5\,1/2}$	−9	2985.032	4	*WA*	33490.707	$11458_{5\,1/2} - 44949^{\circ}_{4\,1/2}$	49
2964.526	4	*WA*	33722.356	$14827_{3\,1/2} - 48549^{\circ}_{4\,1/2}$	−10	2985.818	50	*MT*	33481.891	$6389^{\circ}_{4\,1/2} - 39871_{4\,1/2}$	1
2964.801	90	*MT*	33719.228	$5675^{\circ}_{4\,1/2} - 39394_{3\,1/2}$	−1	2985.907	30	*WA*	33480.893	$3363^{\circ}_{2\,1/2} - 36844_{2\,1/2}$	16
2965.133	8	*WA*	33715.453	$3363^{\circ}_{2\,1/2} - 37078_{1\,1/2}$	2	2986.668	20	*WA*	33472.363	$1873^{\circ}_{3\,1/2} - 35346_{3\,1/2}$	15
2965.269	70	*WA*	33713.907	$5118^{\circ}_{2\,1/2} - 38832_{2\,1/2}$	4	2987.120	3	*WA*	33467.298	$8280^{\circ}_{2\,1/2} - 41748_{1\,1/2}$	−34
2965.837	7	*WA*	33707.450	$4266^{\circ}_{3\,1/2} - 37973_{3\,1/2}$	72	2987.351	10	*WA*	33464.710	$15803_{4\,1/2} - 49267^{\circ}_{4\,1/2}$	39
2966.123	3	*WA*	33704.201			2987.543	4	*WA*	33462.560	$5616_{4\,1/2} - 39079^{\circ}_{5\,1/2}$	1
										$4511^{\circ}_{2\,1/2} - 37973_{3\,1/2}$	41
2966.478	3	*WA*	33700.167	$9634^{\circ}_{1\,1/2} - 43334_{0\,1/2}$	20						
2966.798	6	*WA*	33696.532	$17475^{\circ}_{4\,1/2} - 51171_{3\,1/2}$	−35	2988.638	1	*WA*	33450.300	$4201^{\circ}_{1\,1/2} - 37652_{2\,1/2}$	102
2967.107	10	*WA*	33693.023	$2595^{\circ}_{1\,1/2} - 36288_{0\,1/2}$	9	2988.878	5	*WA*	33447.614	$4523^{\circ}_{4\,1/2} - 37970_{5\,1/2}$	115
2967.315	4	*WA*	33690.662	$5118^{\circ}_{2\,1/2} - 38809_{3\,1/2}$	−7	2989.019	2	*WA*	33446.036	$15822_{3\,1/2} - 49267^{\circ}_{4\,1/2}$	113
2967.866	4	*WA*	33684.407	$4844^{\circ}_{1\,1/2} - 38529_{2\,1/2}$	31	2989.313	3	*WA*	33442.747		
2968.119	3	*WA*	33681.536	$9778^{\circ}_{2\,1/2} - 43460_{2\,1/2}$	−10	2989.566	10	*WA*	33439.917	$10641^{\circ}_{2\,1/2} - 44081_{1\,1/2}$	−15
2968.362	6	*WA*	33678.779	$5716^{\circ}_{3\,1/2} - 39394_{3\,1/2}$	2					$7233^{\circ}_{5\,1/2} - 40673_{5\,1/2}$	−30
2968.582	1	*WA*	33676.283	$9491^{\circ}_{0\,1/2} - 43167_{1\,1/2}$	−101	2990.435	3	*WA*	33430.200	$5964^{\circ}_{3\,1/2} - 39394_{3\,1/2}$	106
2968.735	2	*WA*	33674.548	$4459^{\circ}_{3\,1/2} - 38134_{4\,1/2}$	20	2990.872	200	*AK*	33425.316	$2382^{\circ}_{4\,1/2} - 35807_{4\,1/2}$	−5
2970.315	35	*WA*	33656.636	$3995^{\circ}_{3\,1/2} - 37652_{2\,1/2}$	5	2991.400	4	*WA*	33419.416	$8169^{\circ}_{1\,1/2} - 41589_{0\,1/2}$	−20
2971.196	4	*WA*	33646.657	$4201^{\circ}_{1\,1/2} - 37848_{2\,1/2}$	0	2991.709	30	*WA*	33415.965	$15134_{4\,1/2} - 48549^{\circ}_{4\,1/2}$	25
2971.840	2	*WA*	33639.366	$2563^{\circ}_{5\,1/2} - 36202_{4\,1/2}$	42	2991.898	20	*MT*	33413.854	$4201^{\circ}_{1\,1/2} - 37615_{0\,1/2}$	13
2972.583	80	*WA*	33630.958	$8402^{\circ}_{3\,1/2} - 42033_{2\,1/2}$	−28	2992.223	10	*WA*	33410.225	$5118^{\circ}_{2\,1/2} - 38529_{2\,1/2}$	10
2973.436	10	*WA*	33621.310	$2581^{\circ}_{4\,1/2} - 36202_{4\,1/2}$	11	2992.366	8	*WA*	33408.628	$15859_{4\,1/2} - 49267^{\circ}_{4\,1/2}$	9
2974.018	8	*WA*	33614.731	$4523^{\circ}_{4\,1/2} - 38137_{5\,1/2}$	83	2993.404	1	*WA*	33397.044	$10684^{\circ}_{0\,1/2} - 44081_{1\,1/2}$	110
2974.315	1	*WA*	33611.375	$4523^{\circ}_{4\,1/2} - 38134_{4\,1/2}$	8	2994.137	7	*WA*	33388.868	$9778^{\circ}_{2\,1/2} - 43167_{1\,1/2}$	−25
2974.482	40	*MT*	33609.488	$5283^{\circ}_{0\,1/2} - 38892_{0\,1/2}$	16	2994.418	90	*WA*	33385.735	$4266^{\circ}_{3\,1/2} - 37652_{2\,1/2}$	41
2974.605	40	*MT*	33608.098	$4844^{\circ}_{1\,1/2} - 38452_{1\,1/2}$	−7	2994.955	2	*WA*	33379.749	$7293^{\circ}_{6\,1/2} - 40673_{5\,1/2}$	112
2975.115	2	*WA*	33602.337	$3593^{\circ}_{4\,1/2} - 37196_{4\,1/2}$	83	2995.047	1	*WA*	33378.724	$7722_{2\,1/2} - 41100^{\circ}_{2\,1/2}$	77
2975.402	5	*WA*	33599.096	$7259^{\circ}_{3\,1/2} - 40858_{4\,1/2}$	−33	2995.387	3	*WA*	33374.935	$9198^{\circ}_{3\,1/2} - 42573_{3\,1/2}$	71
2975.601	5	*WA*	33596.849	$3745^{\circ}_{1\,1/2} - 37342_{2\,1/2}$	−2	2995.641	260	*WA*	33372.106	$7713^{\circ}_{4\,1/2} - 41085_{3\,1/2}$	−18
2975.939	20	*MT*	33593.033	$3995^{\circ}_{3\,1/2} - 37588_{3\,1/2}$	21					$5437^{\circ}_{3\,1/2} - 38809_{3\,1/2}$	52
2976.107	3	*WA*	33591.137	$14739_{2\,1/2} - 48330^{\circ}_{3\,1/2}$	109	2997.468	8	*WA*	33351.766	$1873^{\circ}_{3\,1/2} - 35225_{2\,1/2}$	44
2976.900	320	*WA*	33582.190	$4266^{\circ}_{3\,1/2} - 37848_{2\,1/2}$	37	2997.715	4	*WA*	33349.018		
2977.461	120	*MT*	33575.862	$5819^{\circ}_{4\,1/2} - 39394_{3\,1/2}$	−17	2997.901	3	*WA*	33346.949	$3995^{\circ}_{3\,1/2} - 37342_{2\,1/2}$	82
2977.548	8	*WA*	33574.881			2998.014	5	*WA*	33345.692	$10114^{\circ}_{2\,1/2} - 43460_{2\,1/2}$	42
2977.769	6	*WA*	33572.389	$8175^{\circ}_{2\,1/2} - 41748_{1\,1/2}$	−26	2998.769	40	*MT*	33337.297	$4511^{\circ}_{2\,1/2} - 37848_{2\,1/2}$	4
2977.941	4	*WA*	33570.451	$3508^{\circ}_{0\,1/2} - 37078_{1\,1/2}$	42	2998.921	3	*WA*	33335.607	$7522^{\circ}_{5\,1/2} - 40858_{4\,1/2}$	24
2978.810	4	*WA*	33560.658	$7522^{\circ}_{5\,1/2} - 41083_{4\,1/2}$	−14	2999.066	10	*MT*	33333.995	$5118^{\circ}_{2\,1/2} - 38452_{1\,1/2}$	52
2979.356	3	*WA*	33554.508	$10088^{\circ}_{1\,1/2} - 43643_{0\,1/2}$	−81	2999.317	2	*WA*	33331.206	$8702^{\circ}_{1\,1/2} - 42033_{2\,1/2}$	−4
2979.521	1	*WA*	33552.650	$0^{\circ}_{3\,1/2} - 33552_{2\,1/2}$	68	2999.432	18	*WA*	33329.928	$3593^{\circ}_{4\,1/2} - 36923_{4\,1/2}$	21
2980.410	100	*WA*	33542.642	$14481^{\circ}_{2\,1/2} - 48024_{2\,1/2}$	−102	2999.480	18	*WA*	33329.395	$4322^{\circ}_{2\,1/2} - 37652_{2\,1/2}$	12
2981.211	3	*WA*	33533.630	$9634^{\circ}_{1\,1/2} - 43167_{1\,1/2}$	−63	3000.068	60	*MT*	33322.863	$2879^{\circ}_{5\,1/2} - 36202_{4\,1/2}$	1
2981.395	3	*WA*	33531.561			3000.132	4	*WA*	33322.152	$4266^{\circ}_{3\,1/2} - 37588_{3\,1/2}$	76
2981.902	70	*WA*	33525.859	$4322^{\circ}_{2\,1/2} - 37848_{2\,1/2}$	18	3000.330	6	*WA*	33319.953	$7878^{\circ}_{3\,1/2} - 41198_{2\,1/2}$	−27

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3000.597	4	*WA*	33316.988			3024.377	2	*WA*	33055.035	$1873°_{3\frac{1}{2}} - 34928_{4\frac{1}{2}}$	0
3002.134	130	*WA*	33299.931	$3593°_{4\frac{1}{2}} - 36893_{3\frac{1}{2}}$	44	3024.571	30	*MT*	33052.915	$10114°_{2\frac{1}{2}} - 43167_{1\frac{1}{2}}$	−79
3002.376	6	*WA*	33297.247			3025.126	8	*WA*	33046.851	$1873°_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−2
3002.744	150	*WA*	33293.167	$4511°_{2\frac{1}{2}} - 37804_{1\frac{1}{2}}$	−9	3025.227	4	*WA*	33045.748	$8702°_{1\frac{1}{2}} - 41748_{1\frac{1}{2}}$	−86
3003.155	1	*WA*	33288.611	$6549°_{2\frac{1}{2}} - 39838_{2\frac{1}{2}}$	74	3025.298	4	*WA*	33044.972	$0°_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−122
3003.561	100	*PK*	33284.111	$2641°_{3\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−11	3026.619	30	*PK*	33030.550	$4201°_{1\frac{1}{2}} - 37232_{1\frac{1}{2}}$	5
3003.680	3	*WA*	33282.793	$10798°_{2\frac{1}{2}} - 44081_{1\frac{1}{2}}$	−26	3026.807	1	*WA*	33028.499	$8169°_{1\frac{1}{2}} - 41198_{2\frac{1}{2}}$	−111
3005.213	3	*WA*	33265.816	$4322°_{2\frac{1}{2}} - 37588_{3\frac{1}{2}}$	51	3027.162	2	*WA*	33024.626	$18147°_{2\frac{1}{2}} - 51171_{3\frac{1}{2}}$	40
3007.032	5	*WA*	33245.693	$10088°_{1\frac{1}{2}} - 43334_{0\frac{1}{2}}$	0	3027.368	2	*WA*	33022.378	$8175°_{2\frac{1}{2}} - 41198_{2\frac{1}{2}}$	−67
3008.131	70	*WA*	33233.548	$6638°_{4\frac{1}{2}} - 39871_{4\frac{1}{2}}$	−26	3027.621	20	*PK*	33019.619	$4322°_{2\frac{1}{2}} - 37342_{2\frac{1}{2}}$	0
3008.584	3	*WA*	33228.544			3028.171	5	*WA*	33013.622	$5924°_{1\frac{1}{2}} - 38937_{1\frac{1}{2}}$	10
3008.785	320	*WA*	33226.324	$2581°_{4\frac{1}{2}} - 35807_{4\frac{1}{2}}$	13	3028.664	4	*WA*	33008.248	$3508°_{0\frac{1}{2}} - 36516_{1\frac{1}{2}}$	−79
3009.770	3	*WA*	33215.451			3028.753	6	*WA*	33007.279	$14481°_{2\frac{1}{2}} - 47489_{3\frac{1}{2}}$	−70
3010.456	9	*PK*	33207.882	$4322°_{2\frac{1}{2}} - 37530_{1\frac{1}{2}}$	−42	3028.958	50	*MT*	33005.044	$6389°_{4\frac{1}{2}} - 39394_{3\frac{1}{2}}$	−6
3010.549	6	*WA*	33206.856	$7878°_{3\frac{1}{2}} - 41085_{3\frac{1}{2}}$	−29	3030.309	140	*WA*	32990.331	$5819°_{4\frac{1}{2}} - 38809_{3\frac{1}{2}}$	−31
3010.724	3	*WA*	33204.926	$7878°_{3\frac{1}{2}} - 41083_{4\frac{1}{2}}$	−39	3030.471	5	*WA*	32988.567	$7522°_{0\frac{1}{2}} - 40511_{1\frac{1}{2}}$	−101
3011.471	2	*WA*	33196.690	$15134_{4\frac{1}{2}} - 48330°_{3\frac{1}{2}}$	−49	3030.621	6	*WA*	32986.934	$5283°_{0\frac{1}{2}} - 38269_{0\frac{1}{2}}$	−10
3011.877	40	*PK*	33192.216	$4459°_{3\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−2	3030.858	5	*WA*	32984.355		
3012.061	2	*WA*	33190.188	$3703°_{3\frac{1}{2}} - 36893_{3\frac{1}{2}}$	12	3031.497	5	*WA*	32977.403	$2581°_{4\frac{1}{2}} - 35558_{3\frac{1}{2}}$	−41
3012.180	3	*WA*	33188.877	$9269°_{0\frac{1}{2}} - 42458_{1\frac{1}{2}}$	−39	3032.334	10	*WA*	32968.301	$5924°_{1\frac{1}{2}} - 38892_{0\frac{1}{2}}$	4
3012.484	6	*WA*	33185.528	$10274°_{3\frac{1}{2}} - 43460_{2\frac{1}{2}}$	−33	3032.727	30	*MT*	32964.028	$2382°_{4\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−7
3013.170	10	*WA*	33177.973	$14252_{3\frac{1}{2}} - 47430°_{3\frac{1}{2}}$	−32	3033.050	10	*MT*	32960.518	$7713°_{4\frac{1}{2}} - 40673_{5\frac{1}{2}}$	32
3013.311	1	*WA*	33176.420	$2382°_{4\frac{1}{2}} - 35558_{3\frac{1}{2}}$	−35	3033.125	60	*WA*	32959.703	$4844°_{1\frac{1}{2}} - 37804_{1\frac{1}{2}}$	−86
3013.923	1	*WA*	33169.684	$5283°_{0\frac{1}{2}} - 38452_{1\frac{1}{2}}$	−36	3034.301	4	*WA*	32946.930		
3014.105	7	*WA*	33167.681	$987°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	−18	3035.008	8	*WA*	32939.255	$1873°_{3\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−12
3014.257	12	*PK*	33166.009	$2641°_{3\frac{1}{2}} - 35807_{4\frac{1}{2}}$	0	3035.863	12	*MT*	32929.978	$16159°_{3\frac{1}{2}} - 49089_{2\frac{1}{2}}$	29
3014.470	5	*WA*	33163.665			3036.018	3	*WA*	32928.297	$3995°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−31
3015.414	10	*WA*	33153.283	$3363°_{2\frac{1}{2}} - 36516_{1\frac{1}{2}}$	−87	3036.059	1	*WA*	32927.853	$2879°_{5\frac{1}{2}} - 35807_{4\frac{1}{2}}$	−19
3016.479	2	*WA*	33141.579	$12456_{3\frac{1}{2}} - 45598°_{3\frac{1}{2}}$	24	3037.049	10	*WA*	32917.119	$2641°_{3\frac{1}{2}} - 35558_{3\frac{1}{2}}$	−23
3016.556	3	*WA*	33140.733	$3703°_{3\frac{1}{2}} - 36844_{2\frac{1}{2}}$	22	3037.274	8	*WA*	32914.681	$4737°_{2\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−36
3017.096	12	*WA*	33134.802	$2581°_{4\frac{1}{2}} - 35716_{5\frac{1}{2}}$	−23	3037.728	170	*AK*	32909.762	$4322°_{2\frac{1}{2}} - 37232_{1\frac{1}{2}}$	32
3017.195	300	*MT*	33133.714	$5675°_{4\frac{1}{2}} - 38809_{3\frac{1}{2}}$	2	3038.785	2	*WA*	32898.315	$3995°_{3\frac{1}{2}} - 36893_{3\frac{1}{2}}$	6
3018.771	4	*WA*	33116.417	$5716°_{3\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−75	3038.993	6	*WA*	32896.064	$15434_{2\frac{1}{2}} - 48330°_{3\frac{1}{2}}$	−26
3018.844	1	*WA*	33115.616	$16152_{3\frac{1}{2}} - 49267°_{4\frac{1}{2}}$	12	3039.253	8	*WA*	32893.250	$17475°_{4\frac{1}{2}} - 50368_{3\frac{1}{2}}$	−71
3019.253	1	*WA*	33111.131	$4737°_{2\frac{1}{2}} - 37848_{2\frac{1}{2}}$	−45	3039.512	35	*WA*	32890.447	$5651°_{5\frac{1}{2}} - 38541_{4\frac{1}{2}}$	−68
3019.871	1	*WA*	33104.355	$5437°_{3\frac{1}{2}} - 38541_{4\frac{1}{2}}$	−95	3039.572	8	*WA*	32889.798	$5942°_{3\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−112
3020.378	1	*WA*	33098.798	$3745°_{1\frac{1}{2}} - 36844_{2\frac{1}{2}}$	−31	3039.868	3	*WA*	32886.595	$8702°_{1\frac{1}{2}} - 41589_{0\frac{1}{2}}$	−80
3020.883	60	*MT*	33093.265	$5716°_{3\frac{1}{2}} - 38809_{3\frac{1}{2}}$	6	3040.007	3	*WA*	32885.092	$1410°_{4\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−53
3021.038	40	*WA*	33091.568	$5437°_{3\frac{1}{2}} - 38529_{2\frac{1}{2}}$	−30	3040.252	8	*WA*	32882.442	$4459°_{3\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−12
3022.353	4	*WA*	33077.170	$4511°_{2\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−45	3040.468	2	*WA*	32880.106	$10454°_{1\frac{1}{2}} - 43334_{0\frac{1}{2}}$	44
3022.463	6	*PK*	33075.967	$4266°_{3\frac{1}{2}} - 37342_{2\frac{1}{2}}$	37	3041.610	12	*WA*	32867.761	$5964°_{3\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−51
3022.677	1	*WA*	33073.625	$11007°_{1\frac{1}{2}} - 44081_{1\frac{1}{2}}$	49	3041.763	5	*WA*	32866.108	$5675°_{4\frac{1}{2}} - 38541_{4\frac{1}{2}}$	−1
3022.789	25	*WA*	33072.399	$16545_{5\frac{1}{2}} - 49617°_{5\frac{1}{2}}$	−31	3042.077	4	*WA*	32862.716	$0°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−50
3023.189	4	*WA*	33068.024	$17300°_{3\frac{1}{2}} - 50368_{3\frac{1}{2}}$	−10	3042.172	3	*WA*	32861.690	$2595°_{1\frac{1}{2}} - 35457_{1\frac{1}{2}}$	16
3023.285	3	*WA*	33066.974	$4737°_{2\frac{1}{2}} - 37804_{1\frac{1}{2}}$	−86	3042.796	2	*WA*	32854.951	$5118°_{2\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−18
3023.433	20	*WA*	33065.355	$4523°_{4\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−84	3043.094	10	*WA*	32851.734	$12097_{3\frac{1}{2}} - 44949°_{4\frac{1}{2}}$	0
3023.485	30	*MT*	33064.787	$8927°_{5\frac{1}{2}} - 41992_{6\frac{1}{2}}$	−54	3043.269	4	*WA*	32849.844	$9723°_{4\frac{1}{2}} - 42573_{3\frac{1}{2}}$	−11
3023.880	8	*WA*	33060.468	$1873°_{3\frac{1}{2}} - 34934_{2\frac{1}{2}}$	−20	3043.713	4	*WA*	32845.053	$6549°_{2\frac{1}{2}} - 39394_{3\frac{1}{2}}$	−31
3023.966	6	*WA*	33059.527	$4910°_{5\frac{1}{2}} - 37970_{5\frac{1}{2}}$	−41	3044.395	35	*MT*	32837.695	$5010°_{2\frac{1}{2}} - 37848_{2\frac{1}{2}}$	15
3024.166	2	*WA*	33057.341	$2140°_{0\frac{1}{2}} - 35197_{1\frac{1}{2}}$	−6	3044.615	1	*WA*	32835.322	$9198°_{3\frac{1}{2}} - 42033_{2\frac{1}{2}}$	−6

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3045.672	8	*WA*	32823.927	$987°_{4\frac{1}{2}} - 33811_{4\frac{1}{2}}$	−28	3069.320	6	*WA*	32571.041	$4322°_{2\frac{1}{2}} - 36893_{3\frac{1}{2}}$	−20
3045.792	5	*WA*	32822.634	$2634°_{2\frac{1}{2}} - 35457_{1\frac{1}{2}}$	−17	3069.642	70	*WA*	32567.625	$4511°_{2\frac{1}{2}} - 37078_{1\frac{1}{2}}$	3
3046.124	10	*WA*	32819.057	$10641°_{2\frac{1}{2}} - 43460_{2\frac{1}{2}}$	−33	3069.721	8	*WA*	32566.786	$1410°_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−49
3046.708	50	*WA*	32812.766	$5716°_{3\frac{1}{2}} - 38529_{2\frac{1}{2}}$	−38	3070.150	1	*WA*	32562.236	$3363°_{2\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−18
				$7059°_{4\frac{1}{2}} - 39871_{4\frac{1}{2}}$	6	3070.407	3	*WA*	32559.511	$7278°_{1\frac{1}{2}} - 39838_{2\frac{1}{2}}$	−11
3047.207	5	*WA*	32807.393	$4844°_{1\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−53	3071.110	60	*MT*	32552.058	$1873°_{3\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−44
3047.503	4	*WA*	32804.207	$8280°_{2\frac{1}{2}} - 41085_{3\frac{1}{2}}$	−60	3071.615	70	*PK*	32546.706	$2382°_{4\frac{1}{2}} - 34928_{4\frac{1}{2}}$	−16
3047.784	2	*WA*	32801.183	$15529_{2\frac{1}{2}} - 48330°_{3\frac{1}{2}}$	−30	3072.390	40	*WA*	32538.497	$2382°_{4\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−44
3048.308	6	*WA*	32795.544	$8402°_{3\frac{1}{2}} - 41198_{2\frac{1}{2}}$	−96	3072.445	2	*WA*	32537.914	$12057°_{2\frac{1}{2}} - 44594_{2\frac{1}{2}}$	93
3048.437	6	*WA*	32794.156	$9778°_{2\frac{1}{2}} - 42573_{3\frac{1}{2}}$	−48	3072.798	5	*WA*	32534.176		
3048.517	8	*WA*	32793.296	$4737°_{2\frac{1}{2}} - 37530_{1\frac{1}{2}}$	36	3072.886	80	*WA*	32533.245	$5118°_{2\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−39
3050.299	10	*WA*	32774.139	$3363°_{2\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−37	3073.336	10	*MT*	32528.481	$5924°_{1\frac{1}{2}} - 38452_{1\frac{1}{2}}$	−64
3050.583	30	*WA*	32771.088	$4844°_{1\frac{1}{2}} - 37615_{0\frac{1}{2}}$	−1	3073.429	2	*WA*	32527.497	$15803_{4\frac{1}{2}} - 48330°_{3\frac{1}{2}}$	18
3051.160	8	*PK*	32764.891	$7746°_{2\frac{1}{2}} - 40511_{1\frac{1}{2}}$	−50	3073.538	4	*WA*	32526.344	$10641°_{2\frac{1}{2}} - 43167_{1\frac{1}{2}}$	−91
3051.287	4	*WA*	32763.527	$15281_{6\frac{1}{2}} - 48045°_{6\frac{1}{2}}$	29	3073.990	10	*PK*	32521.561	$4322°_{2\frac{1}{2}} - 36844_{2\frac{1}{2}}$	−35
3051.924	20	*WA*	32756.689	$6638°_{4\frac{1}{2}} - 39394_{3\frac{1}{2}}$	−45	3074.164	8	*WA*	32519.720	$5010°_{2\frac{1}{2}} - 37530_{1\frac{1}{2}}$	−42
3051.975	160	*MT*	32756.141	$4322°_{2\frac{1}{2}} - 37078_{1\frac{1}{2}}$	−29	3074.323	12	*WA*	32518.039	$3593°_{4\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−99
3052.684	5	*WA*	32748.534	$3363°_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−59	3075.206	4	*WA*	32508.702	$15822_{3\frac{1}{2}} - 48330°_{3\frac{1}{2}}$	−28
3053.015	5	*WA*	32744.984	$1410°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	−22	3075.534	6	*WA*	32505.235		
3054.200	4	*WA*	32732.279	$14727_{1\frac{1}{2}} - 47459°_{2\frac{1}{2}}$	−74	3076.132	5	*WA*	32498.916	$3703°_{3\frac{1}{2}} - 36202_{4\frac{1}{2}}$	−46
3054.443	5	*WA*	32729.676	$5118°_{2\frac{1}{2}} - 37848_{2\frac{1}{2}}$	−67	3076.250	35	*WA*	32497.670	$4844°_{1\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−12
3054.613	4	*WA*	32727.854	$15822_{3\frac{1}{2}} - 48549°_{4\frac{1}{2}}$	−76	3076.418	1	*WA*	32495.895	$8702°_{1\frac{1}{2}} - 41198_{2\frac{1}{2}}$	30
3055.098	8	*WA*	32722.659	$16545_{5\frac{1}{2}} - 49267°_{4\frac{1}{2}}$	−53	3076.893	6	*MT*	32490.879		
3055.238	280	*WA*	32721.159	$4511°_{2\frac{1}{2}} - 37232_{1\frac{1}{2}}$	−21	3077.330	50	*WA*	32486.265	$5651°_{5\frac{1}{2}} - 38137_{5\frac{1}{2}}$	−59
3056.130	6	*WA*	32711.609	$2634°_{2\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−6	3077.637	40	*WA*	32483.025	$5651°_{5\frac{1}{2}} - 38134_{4\frac{1}{2}}$	−17
3056.775	260	*WA*	32704.707	$2641°_{3\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−15	3078.905	8	*PK*	32469.648	$5118°_{2\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−18
3057.383	10	*WA*	32698.204			3079.453	10	*WA*	32463.870	$4459°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−46
3058.107	10	*WA*	32690.463	$14739_{2\frac{1}{2}} - 47430°_{3\frac{1}{2}}$	40	3079.639	80	*PK*	32461.909	$5675°_{4\frac{1}{2}} - 38137_{5\frac{1}{2}}$	−9
3058.551	35	*WA*	32685.717	$5118°_{2\frac{1}{2}} - 37804_{1\frac{1}{2}}$	90	3079.905	70	*WA*	32459.106	$1873°_{3\frac{1}{2}} - 34333_{2\frac{1}{2}}$	−57
3059.734	20	*WA*	32673.080	$4523°_{4\frac{1}{2}} - 37196_{4\frac{1}{2}}$	−25	3079.950	10	*PK*	32458.631	$5675°_{4\frac{1}{2}} - 38134_{4\frac{1}{2}}$	−5
3059.903	1	*WA*	32671.276	$10058_{6\frac{1}{2}} - 42729°_{5\frac{1}{2}}$	55	3080.635	60	*WA*	32451.414	$15593_{5\frac{1}{2}} - 48045°_{6\frac{1}{2}}$	−25
3060.778	3	*WA*	32661.937	$10798°_{2\frac{1}{2}} - 43460_{2\frac{1}{2}}$	−40	3081.245	2	*WA*	32444.990	$14252_{3\frac{1}{2}} - 46697°_{4\frac{1}{2}}$	84
3061.208	7	*WA*	32657.349	$4266°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−42	3081.984	5	*WA*	32437.210	$12456_{3\frac{1}{2}} - 44893°_{3\frac{1}{2}}$	18
3062.608	2	*WA*	32642.421	$4201°_{1\frac{1}{2}} - 36844_{2\frac{1}{2}}$	9	3082.304	80	*WA*	32433.843	$4459°_{3\frac{1}{2}} - 36893_{3\frac{1}{2}}$	−54
3063.008	550	*WA*	32638.158	$7233°_{5\frac{1}{2}} - 39871_{4\frac{1}{2}}$	−47	3083.067	7	*WA*	32425.817	$12704_{1\frac{1}{2}} - 45130°_{2\frac{1}{2}}$	−77
3063.389	5	*WA*	32634.099	$1410°_{4\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−37	3083.408	6	*WA*	32422.231	$987°_{4\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−54
3063.776	3	*WA*	32629.977	$2595°_{1\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−34	3083.484	2	*WA*	32421.432	$1873°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−83
3064.024	15	*MT*	32627.336	$4266°_{3\frac{1}{2}} - 36893_{3\frac{1}{2}}$	−36	3083.670	260	*MT*	32419.476	$6389°_{4\frac{1}{2}} - 38809_{3\frac{1}{2}}$	−57
3065.395	6	*WA*	32612.744	$7259°_{3\frac{1}{2}} - 39871_{4\frac{1}{2}}$	−13	3083.879	3	*WA*	32417.279	$18147°_{2\frac{1}{2}} - 50564_{2\frac{1}{2}}$	−19
3065.779	8	*WA*	32608.659	$3593°_{4\frac{1}{2}} - 36202_{4\frac{1}{2}}$	−15	3083.956	6	*PK*	32416.470	$6521°_{1\frac{1}{2}} - 38937_{1\frac{1}{2}}$	−13
3066.133	5	*WA*	32604.895	$4737°_{2\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−58	3084.257	8	*WA*	32413.306	$0°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−39
3066.380	18	*MT*	32602.268	$2595°_{1\frac{1}{2}} - 35197_{1\frac{1}{2}}$	73	3084.466	200	*MT*	32411.110	$5437°_{3\frac{1}{2}} - 37848_{2\frac{1}{2}}$	−17
3066.649	2	*WA*	32599.409	$14097_{3\frac{1}{2}} - 46697°_{4\frac{1}{2}}$	19	3084.723	3	*WA*	32408.410	$3703°_{3\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−16
3067.443	6	*WA*	32590.971	$2634°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−18	3085.070	6	*GJ*	32404.765		
3067.895	10	*WA*	32586.169	$5942°_{3\frac{1}{2}} - 38529_{2\frac{1}{2}}$	−53	3085.415	4	*WA*	32401.142	$1410°_{4\frac{1}{2}} - 33811_{4\frac{1}{2}}$	−120
3068.085	1	*WA*	32584.151	$2641°_{3\frac{1}{2}} - 35225_{2\frac{1}{2}}$	55	3085.453	4	*WA*	32400.[illegible]	[illegible]$°_{4\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−12
3068.542	1	*WA*	32579.299	$7259°_{3\frac{1}{2}} - 39838_{2\frac{1}{2}}$	−70	3085.577	3	*WA*	32399.441	$9634°_{1\frac{1}{2}} - 42033_{2\frac{1}{2}}$	−27
3068.674	50	*WA*	32577.897	$4266°_{3\frac{1}{2}} - 36844_{2\frac{1}{2}}$	−10	3085.758	10	*WA*	32397.540	$16152_{3\frac{1}{2}} - 48549°_{4\frac{1}{2}}$	−72
3068.817	4	*WA*	32576.380	$7278°_{1\frac{1}{2}} - 39855_{0\frac{1}{2}}$	−92	3086.271	2	*WA*	32392.155	$3745°_{1\frac{1}{2}} - 36137_{2\frac{1}{2}}$	27
3069.147	3	*MT*	32572.877	$5969°_{5\frac{1}{2}} - 38541_{4\frac{1}{2}}$	11	3086.678	5	*WA*	32387.884	$6549°_{2\frac{1}{2}} - 38937_{1\frac{1}{2}}$	−23

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3087.011	3	*WA*	32384.391	$4459°_{3\frac{1}{2}}-36844_{2\frac{1}{2}}$	−41	3104.593	5	*WA*	32200.998	$14387_{4\frac{1}{2}}-46588°_{5\frac{1}{2}}$	−20
3087.183	12	*WA*	32382.587	$4511°_{2\frac{1}{2}}-36893_{3\frac{1}{2}}$	74	3104.928	4	*WA*	32197.524	$16133_{2\frac{1}{2}}-48330°_{3\frac{1}{2}}$	−71
3087.399	10	*WA*	32380.321	$13217_{3\frac{1}{2}}-45598°_{3\frac{1}{2}}$	−3	3105.148	8	*WA*	32195.243	$3363°_{2\frac{1}{2}}-35558_{3\frac{1}{2}}$	−31
3088.312	8	*WA*	32370.749	$4523°_{4\frac{1}{2}}-36893_{3\frac{1}{2}}$	12	3105.259	15	*PK*	32194.092	$4322°_{2\frac{1}{2}}-36516_{1\frac{1}{2}}$	2
3088.372	2	*WA*	32370.120	$10088°_{1\frac{1}{2}}-42458_{1\frac{1}{2}}$	17	3105.501	5	*WA*	32191.583	$5942°_{3\frac{1}{2}}-38134_{4\frac{1}{2}}$	−18
3090.369	160	*PK*	32349.203	$7522°_{5\frac{1}{2}}-39871_{4\frac{1}{2}}$	−8	3106.777	2	*WA*	32178.362	$16152_{3\frac{1}{2}}-48330°_{3\frac{1}{2}}$	−50
3090.512	60	*PK*	32347.707	$2581°_{4\frac{1}{2}}-34928_{4\frac{1}{2}}$	−4	3107.464	160	*PK*	32171.249	$6638°_{4\frac{1}{2}}-38809_{3\frac{1}{2}}$	31
3090.700	12	*WA*	32345.739	$5924°_{1\frac{1}{2}}-38269_{0\frac{1}{2}}$	−30	3107.538	2	*MT*	32170.482	$1873°_{3\frac{1}{2}}-34044_{4\frac{1}{2}}$	−24
3090.880	20	*MT*	32343.855	$10114°_{2\frac{1}{2}}-42458_{1\frac{1}{2}}$	−4	3107.636	4	*WA*	32169.468	$5964°_{3\frac{1}{2}}-38134_{4\frac{1}{2}}$	−35
3091.108	4	*WA*	32341.470	$8169°_{1\frac{1}{2}}-40511_{1\frac{1}{2}}$	41	3108.552	3	*WA*	32159.989	$11007°_{1\frac{1}{2}}-43167_{1\frac{1}{2}}$	−89
				$4737°_{2\frac{1}{2}}-37078_{1\frac{1}{2}}$	−35						
						3108.673	2	*WA*	32158.737	$7713°_{4\frac{1}{2}}-39871_{4\frac{1}{2}}$	−6
3091.294	50	*MT*	32339.524	$2581°_{4\frac{1}{2}}-34920_{3\frac{1}{2}}$	−6	3108.924	15	*WA*	32156.141		
3091.366	4	*WA*	32338.771	$2595°_{1\frac{1}{2}}-34934_{2\frac{1}{2}}$	−7	3108.962	80	*PK*	32155.748	$8927°_{5\frac{1}{2}}-41083_{4\frac{1}{2}}$	−31
3091.706	5	*MT*	32335.214	$8175°_{2\frac{1}{2}}-40511_{1\frac{1}{2}}$	−49	3109.379	15	*PK*	32151.436	$5819°_{4\frac{1}{2}}-37970_{5\frac{1}{2}}$	17
3091.918	20	*MT*	32332.997	$7522°_{0\frac{1}{2}}-39855_{0\frac{1}{2}}$	57	3110.278	260	*WA*	32142.143	$3995°_{3\frac{1}{2}}-36137_{2\frac{1}{2}}$	0
				$4511°_{2\frac{1}{2}}-36844_{2\frac{1}{2}}$	−50						
						3110.998	4	*WA*	32134.704	$11325°_{2\frac{1}{2}}-43460_{2\frac{1}{2}}$	−47
3092.035	3	*WA*	32331.774	$3593°_{4\frac{1}{2}}-35925_{3\frac{1}{2}}$	−25	3111.162	240	*PK*	32133.011	$2634°_{2\frac{1}{2}}-34767_{1\frac{1}{2}}$	−13
3092.197	5	*WA*	32330.080	$13268_{2\frac{1}{2}}-45598°_{3\frac{1}{2}}$	−2	3111.234	10	*MT*	32132.267	$5716°_{3\frac{1}{2}}-37848_{2\frac{1}{2}}$	−66
3093.243	12	*WA*	32319.148	$5651°_{5\frac{1}{2}}-37970_{5\frac{1}{2}}$	−26	3111.603	2	*WA*	32128.456	$12466°_{1\frac{1}{2}}-44594_{2\frac{1}{2}}$	−41
3093.339	12	*WA*	32318.145	$0°_{3\frac{1}{2}}-32318_{3\frac{1}{2}}$	−29	3112.202	10	*WA*	32122.273	$3593°_{4\frac{1}{2}}-35716_{5\frac{1}{2}}$	72
3093.611	18	*PK*	32315.304	$5819°_{4\frac{1}{2}}-38134_{4\frac{1}{2}}$	17	3112.426	2	*WA*	32119.961	$11340°_{3\frac{1}{2}}-43460_{2\frac{1}{2}}$	27
3093.950	8	*WA*	32311.763	$14276_{5\frac{1}{2}}-46588°_{5\frac{1}{2}}$	−69	3112.755	8	*WA*	32116.566	$3995°_{3\frac{1}{2}}-36112_{3\frac{1}{2}}$	6
3094.124	2	*WA*	32309.946	$14387_{4\frac{1}{2}}-46697°_{4\frac{1}{2}}$	−25	3113.693	5	*WA*	32106.892	$4737°_{2\frac{1}{2}}-36844_{2\frac{1}{2}}$	−39
3094.198	2	*WA*	32309.173	$987°_{4\frac{1}{2}}-33296_{4\frac{1}{2}}$	−20	3114.052	35	*PK*	32103.190	$1873°_{3\frac{1}{2}}-33977_{3\frac{1}{2}}$	−15
3095.102	12	*WA*	32299.737	$2634°_{2\frac{1}{2}}-34934_{2\frac{1}{2}}$	−19	3114.956	1	*WA*	32093.874	$3363°_{2\frac{1}{2}}-35457_{1\frac{1}{2}}$	−16
3095.262	6	*WA*	32298.068	$5675°_{4\frac{1}{2}}-37973_{3\frac{1}{2}}$	55	3115.116	6	*WA*	32092.226	$7746°_{2\frac{1}{2}}-39838_{2\frac{1}{2}}$	−33
3095.454	1	*WA*	32296.064	$15134_{4\frac{1}{2}}-47430°_{3\frac{1}{2}}$	−69	3115.647	2	*WA*	32086.756	$4201°_{1\frac{1}{2}}-36288_{0\frac{1}{2}}$	−9
3095.582	35	*WA*	32294.729	$5675°_{4\frac{1}{2}}-37970_{5\frac{1}{2}}$	−39	3115.979	5	*MT*	32083.338	$10646_{5\frac{1}{2}}-42729°_{5\frac{1}{2}}$	−38
3095.762	10	*WA*	32292.851	$2641°_{3\frac{1}{2}}-34934_{2\frac{1}{2}}$	−12	3117.006	5	*WA*	32072.767	$11387°_{3\frac{1}{2}}-43460_{2\frac{1}{2}}$	−34
3095.853	6	*PK*	32291.902	$6517°_{2\frac{1}{2}}-38809_{3\frac{1}{2}}$	45	3117.471	4	*WA*	32067.983	$5010°_{2\frac{1}{2}}-37078_{1\frac{1}{2}}$	−25
3096.278	1	*WA*	32287.470	$2641°_{3\frac{1}{2}}-34928_{4\frac{1}{2}}$	60	3117.773	6	*WA*	32064.877		
3096.402	6	*WA*	32286.177	$2634°_{2\frac{1}{2}}-34920_{3\frac{1}{2}}$	55	3118.839	2	*WA*	32053.918	$8804°_{4\frac{1}{2}}-40858_{4\frac{1}{2}}$	−62
3096.501	140	*MT*	32285.145	$4910°_{5\frac{1}{2}}-37196_{4\frac{1}{2}}$	−30	3119.591	12	*WA*	32046.192	$17571_{4\frac{1}{2}}-49617°_{5\frac{1}{2}}$	−106
3096.726	3	*WA*	32282.799	$6549°_{2\frac{1}{2}}-38832_{2\frac{1}{2}}$	−1	3120.473	5	*WA*	32037.134	$7818°_{1\frac{1}{2}}-39855_{0\frac{1}{2}}$	−113
3096.883	50	*MT*	32281.162			3121.085	4	*WA*	32030.853	$5942°_{3\frac{1}{2}}-37973_{3\frac{1}{2}}$	−119
3097.075	30	*WA*	32279.161	$2641°_{3\frac{1}{2}}-34920_{3\frac{1}{2}}$	−67	3121.281	5	*WA*	32028.841		
3098.148	8	*WA*	32267.982	$17000_{3\frac{1}{2}}-49267°_{4\frac{1}{2}}$	7	3121.640	2	*WA*	32025.158	$15434_{2\frac{1}{2}}-47459°_{2\frac{1}{2}}$	−36
3098.958	2	*WA*	32259.548	$6549°_{2\frac{1}{2}}-38809_{3\frac{1}{2}}$	−19	3122.213	3	*WA*	32019.281	$2140°_{0\frac{1}{2}}-34159_{0\frac{1}{2}}$	−103
3099.142	4	*MT*	32257.633	$5716°_{3\frac{1}{2}}-37973_{3\frac{1}{2}}$	73	3122.854	5	*WA*	32012.709	$4910°_{5\frac{1}{2}}-36923_{4\frac{1}{2}}$	−116
3099.426	8	*WA*	32254.678	$9778°_{2\frac{1}{2}}-42033_{2\frac{1}{2}}$	9	3123.344	12	*PK*	32007.687	$6521°_{1\frac{1}{2}}-38529_{2\frac{1}{2}}$	−1
3100.106	1	*WA*	32247.603	$5283°_{0\frac{1}{2}}-37530_{1\frac{1}{2}}$	0	3123.552	35	*PK*	32005.555	$4511°_{2\frac{1}{2}}-36516_{1\frac{1}{2}}$	15
3101.392	10	*WA*	32234.232	$4844°_{1\frac{1}{2}}-37078_{1\frac{1}{2}}$	−2	3123.943	15	*PK*	32001.550	$5969°_{5\frac{1}{2}}-37970_{5\frac{1}{2}}$	25
3101.784	20	*PK*	32230.158	$8280°_{2\frac{1}{2}}-40511_{1\frac{1}{2}}$	−22	3124.097	20	*PK*	31999.972	$9198°_{3\frac{1}{2}}-41198_{2\frac{1}{2}}$	−10
3102.354	8	*WA*	32224.237	$15235_{1\frac{1}{2}}-47459°_{2\frac{1}{2}}$	−77	3124.541	2	*WA*	31995.425	$15434_{2\frac{1}{2}}-47430°_{3\frac{1}{2}}$	−59
3102.431	10	*WA*	32223.437	$5118°_{2\frac{1}{2}}-37342_{2\frac{1}{2}}$	−83	3124.859	8	*WA*	31992.169	$16159°_{3\frac{1}{2}}-48151_{4\frac{1}{2}}$	−33
3102.563	35	*WA*	32222.066	$3703°_{3\frac{1}{2}}-35925_{3\frac{1}{2}}$	−21	3125.358	2	*WA*	31987.061	$7092_{5\frac{1}{2}}-39079°_{5\frac{1}{2}}$	29
3103.008	2	*MT*	32217.445	$2595°_{1\frac{1}{2}}-34813_{2\frac{1}{2}}$	−112	3125.767	12	*WA*	31982.876	$3363°_{2\frac{1}{2}}-35346_{3\frac{1}{2}}$	21
3103.269	8	*WA*	32214.736	$5437°_{3\frac{1}{2}}-37652_{2\frac{1}{2}}$	67	3126.132	1	*WA*	31979.142	$6549°_{2\frac{1}{2}}-38529_{2\frac{1}{2}}$	29
3103.375	300	*WA*	32213.636	$3593°_{4\frac{1}{2}}-35807_{4\frac{1}{2}}$	−49	3127.099	12	*WA*	31969.253	$9778°_{2\frac{1}{2}}-41748_{1\frac{1}{2}}$	−39
3104.006	70	*WA*	32207.087	$3995°_{3\frac{1}{2}}-36202_{4\frac{1}{2}}$	−9	3127.182	5	*MT*	31968.405		

501-968 O - 73 - 5

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3127.536	180	*WA*	31964.787	$3593°_{4\frac{1}{2}}-35558_{3\frac{1}{2}}$	−32	3146.225	40	*WA*	31774.919	$5118°_{2\frac{1}{2}}-36893_{3\frac{1}{2}}$	−44
3127.747	15	*WA*	31962.630	$14625_{5\frac{1}{2}}-46588°_{5\frac{1}{2}}$	3	3146.410	260	*MT*	31773.050	$2382°_{4\frac{1}{2}}-34155_{3\frac{1}{2}}$	−14
3127.996	10	*WA*	31960.086	$5118°_{2\frac{1}{2}}-37078_{1\frac{1}{2}}$	13	3146.780	8	*WA*	31769.315	$5819°_{4\frac{1}{2}}-37588_{3\frac{1}{2}}$	−44
				$7878°_{3\frac{1}{2}}-39838_{2\frac{1}{2}}$	−30	3147.555	5	*WA*	31761.493	$8278_{5\frac{1}{2}}-40039°_{6\frac{1}{2}}$	23
3128.961	3	*WA*	31950.230	$2563°_{5\frac{1}{2}}-34513_{6\frac{1}{2}}$	−4	3147.836	20	*WA*	31758.658	$10274°_{3\frac{1}{2}}-42033_{2\frac{1}{2}}$	−25
										$5437°_{3\frac{1}{2}}-37196_{4\frac{1}{2}}$	−58
3129.041	6	*WA*	31949.413	$5283°_{0\frac{1}{2}}-37232_{1\frac{1}{2}}$	4						
3129.098	3	*WA*	31948.831	$3508°_{0\frac{1}{2}}-35457_{1\frac{1}{2}}$	−16	3148.459	90	*WA*	31752.374	$3593°_{4\frac{1}{2}}-35346_{3\frac{1}{2}}$	−25
3129.310	15	*WA*	31946.667	$12704_{1\frac{1}{2}}-44651°_{1\frac{1}{2}}$	−1	3148.651	60	*WA*	31750.437	$7059°_{4\frac{1}{2}}-38809_{3\frac{1}{2}}$	34
3130.197	15	*MT*	31937.614	$0°_{3\frac{1}{2}}-31937_{3\frac{1}{2}}$	−38	3148.832	6	*WA*	31748.612	$6521°_{1\frac{1}{2}}-38269_{0\frac{1}{2}}$	−29
				$1873°_{3\frac{1}{2}}-33811_{4\frac{1}{2}}$	−18	3148.918	3	*WA*	31747.745	$6389°_{4\frac{1}{2}}-38137_{5\frac{1}{2}}$	6
3130.337	180	*PK*	31936.186	$4266°_{3\frac{1}{2}}-36202_{4\frac{1}{2}}$	26	3149.077	3	*WA*	31746.143	$8927°_{5\frac{1}{2}}-40673_{5\frac{1}{2}}$	82
3130.516	8	*WA*	31934.360	$1873°_{3\frac{1}{2}}-33808_{2\frac{1}{2}}$	−22	3149.248	15	*WA*	31744.419	$6389°_{4\frac{1}{2}}-38134_{4\frac{1}{2}}$	−38
3130.872	220	*WA*	31930.729	$8927°_{5\frac{1}{2}}-40858_{4\frac{1}{2}}$	38	3149.422	40	*WA*	31742.665	$4459°_{3\frac{1}{2}}-36202_{4\frac{1}{2}}$	−19
				$8789_{2\frac{1}{2}}-40720°_{1\frac{1}{2}}$	−12	3149.939	15	*WA*	31737.455	$2595°_{1\frac{1}{2}}-34333_{2\frac{1}{2}}$	2
3130.919	25	*WA*	31930.250	$3995°_{3\frac{1}{2}}-35925_{3\frac{1}{2}}$	28	3150.097	4	*WA*	31735.864	$2140°_{0\frac{1}{2}}-33876_{1\frac{1}{2}}$	−20
3131.505	2	*WA*	31924.275	$5924°_{1\frac{1}{2}}-37848_{2\frac{1}{2}}$	−70	3150.461	4	*WA*	31732.197	$2563°_{5\frac{1}{2}}-34295_{4\frac{1}{2}}$	−19
3131.541	1	*WA*	31923.908	$15565°_{2\frac{1}{2}}-47489_{3\frac{1}{2}}$	48	3150.573	6	*WA*	31731.069	$13217_{3\frac{1}{2}}-44949°_{4\frac{1}{2}}$	34
3131.679	5	*WA*	31922.501	$3793°_{6\frac{1}{2}}-35716_{5\frac{1}{2}}$	52	3150.887	3	*WA*	31727.907	$5924°_{1\frac{1}{2}}-37652_{2\frac{1}{2}}$	20
3132.043	15	*MT*	31918.791	$10114°_{2\frac{1}{2}}-42033_{2\frac{1}{2}}$	19	3151.126	70	*PK*	31725.500	$5118°_{2\frac{1}{2}}-36844_{2\frac{1}{2}}$	2
3132.590	130	*MT*	31913.218	$2382°_{4\frac{1}{2}}-34295_{4\frac{1}{2}}$	14	3152.250	10	*WA*	31714.189	$2581°_{4\frac{1}{2}}-34295_{4\frac{1}{2}}$	−3
3132.640	15	*MT*	31912.709	$5675°_{4\frac{1}{2}}-37588_{3\frac{1}{2}}$	0	3152.489	2	*WA*	31711.784	$3745°_{1\frac{1}{2}}-35457_{1\frac{1}{2}}$	−58
3132.858	3	*MT*	31910.488	$14252_{3\frac{1}{2}}-46162°_{4\frac{1}{2}}$	−25	3152.728	2	*WA*	31709.380	$5942°_{3\frac{1}{2}}-37652_{2\frac{1}{2}}$	88
3133.322	150	*WA*	31905.763	$5942°_{3\frac{1}{2}}-37848_{2\frac{1}{2}}$	11	3153.474	10	*WA*	31701.879	$8774_{4\frac{1}{2}}-40475°_{3\frac{1}{2}}$	19
3133.407	8	*WA*	31904.897	$5437°_{3\frac{1}{2}}-37342_{2\frac{1}{2}}$	−7	3153.821	1	*WA*	31698.392	$2634°_{2\frac{1}{2}}-34333_{2\frac{1}{2}}$	−39
3133.533	3	*WA*	31903.614	$6638°_{4\frac{1}{2}}-38541_{4\frac{1}{2}}$	0	3154.005	8	*WA*	31696.542	$17571_{4\frac{1}{2}}-49267°_{4\frac{1}{2}}$	−38
3133.616	2	*WA*	31902.769	$6549°_{2\frac{1}{2}}-38452_{1\frac{1}{2}}$	−72	3154.504	120	*WA*	31691.529	$2641°_{3\frac{1}{2}}-34333_{2\frac{1}{2}}$	−9
3135.179	15	*WA*	31886.865	$9198°_{3\frac{1}{2}}-41085_{3\frac{1}{2}}$	−22	3154.945	1	*WA*	31687.099	$5964°_{3\frac{1}{2}}-37652_{2\frac{1}{2}}$	−95
3135.566	12	*WA*	31882.930	$5010°_{2\frac{1}{2}}-36893_{3\frac{1}{2}}$	30	3155.461	3	*WA*	31681.917	$7713°_{4\frac{1}{2}}-39394_{3\frac{1}{2}}$	14
3135.833	6	*WA*	31880.215	$5924°_{1\frac{1}{2}}-37804_{1\frac{1}{2}}$	−14	3155.702	150	*PK*	31679.498	$4523°_{4\frac{1}{2}}-36202_{4\frac{1}{2}}$	−25
3136.243	5	*WA*	31876.048	$7061°_{0\frac{1}{2}}-38937_{1\frac{1}{2}}$	70	3155.792	150	*PK*	31678.595	$1873°_{3\frac{1}{2}}-33552_{2\frac{1}{2}}$	−52
3136.719	150	*PK*	31871.211	$4266°_{3\frac{1}{2}}-36137_{2\frac{1}{2}}$	4	3156.422	8	*WA*	31672.272	$4844°_{1\frac{1}{2}}-36516_{1\frac{1}{2}}$	118
3136.903	8	*WA*	31869.342	$8804°_{4\frac{1}{2}}-40673_{5\frac{1}{2}}$	−8	3156.773	12	*WA*	31668.750	$8169°_{1\frac{1}{2}}-39838_{2\frac{1}{2}}$	4
3137.601	90	*MT*	31862.252	$3363°_{2\frac{1}{2}}-35225_{2\frac{1}{2}}$	23	3157.399	8	*WA*	31662.472	$8175°_{2\frac{1}{2}}-39838_{2\frac{1}{2}}$	−109
3137.809	6	*WA*	31860.140			3157.718	10	*WA*	31659.273	$4266°_{3\frac{1}{2}}-35925_{3\frac{1}{2}}$	−11
3138.298	40	*WA*	31855.176	$17232_{7\frac{1}{2}}-49087°_{7\frac{1}{2}}$	−51	3158.262	3	*WA*	31653.820	$2641°_{3\frac{1}{2}}-34295_{4\frac{1}{2}}$	−70
3138.672	1	*WA*	31851.380	$0°_{3\frac{1}{2}}-31851_{2\frac{1}{2}}$	−16	3158.432	12	*WA*	31652.117	$4459°_{3\frac{1}{2}}-36112_{3\frac{1}{2}}$	−31
3139.241	10	*WA*	31845.607	$4266°_{3\frac{1}{2}}-36112_{3\frac{1}{2}}$	−16	3158.812	15	*MT*	31648.309	$10924°_{4\frac{1}{2}}-42573_{3\frac{1}{2}}$	−5
3139.586	1	*WA*	31842.108	$11325°_{2\frac{1}{2}}-43167_{1\frac{1}{2}}$	9	3158.882	8	*WA*	31647.608		
3140.346	2	*WA*	31834.402	$3363°_{2\frac{1}{2}}-35197_{1\frac{1}{2}}$	−10	3159.072	8	*WA*	31645.705	$5942°_{3\frac{1}{2}}-37588_{3\frac{1}{2}}$	30
3140.432	4	*WA*	31833.530	$5010°_{2\frac{1}{2}}-36844_{2\frac{1}{2}}$	95	3159.378	8	*WA*	31642.640	$3703°_{3\frac{1}{2}}-35346_{3\frac{1}{2}}$	−47
3140.676	12	*MT*	31831.057	$13117_{4\frac{1}{2}}-44949°_{4\frac{1}{2}}$	−31	3160.280	5	*WA*	31633.609		
3142.311	90	*WA*	31814.495	$987°_{4\frac{1}{2}}-32802_{5\frac{1}{2}}$	−58	3160.306	8	*WA*	31633.348	$10114°_{2\frac{1}{2}}-41748_{1\frac{1}{2}}$	−47
3142.547	12	*WA*	31812.106	$3995°_{3\frac{1}{2}}-35807_{4\frac{1}{2}}$	−1	3161.026	15	*MT*	31626.143	$5716°_{3\frac{1}{2}}-37342_{2\frac{1}{2}}$	33
3142.890	4	*WA*	31808.635	$8702°_{1\frac{1}{2}}-40511_{1\frac{1}{2}}$	−47	3162.052	3	*WA*	31615.882	$8423_{6\frac{1}{2}}-40039°_{6\frac{1}{2}}$	30
3143.593	8	*WA*	31801.522			3162.279	1	*WA*	31613.613	$7278°_{1\frac{1}{2}}-38892_{0\frac{1}{2}}$	34
3144.596	180	*MT*	31791.378	$2634°_{2\frac{1}{2}}-34426_{2\frac{1}{2}}$	8	3162.835	5	*WA*	31608.055	$15822_{3\frac{1}{2}}-47430°_{3\frac{1}{2}}$	−69
3144.817	10	*WA*	31789.145	$17300°_{3\frac{1}{2}}-49089_{2\frac{1}{2}}$	−30	3162.996	8	*WA*	31606.446	$5924°_{1\frac{1}{2}}-37530_{1\frac{1}{2}}$	18
3145.281	260	*WA*	31784.455	$2641°_{3\frac{1}{2}}-34426_{2\frac{1}{2}}$	−22	3163.345	15	*MT*	31602.960	$4322°_{2\frac{1}{2}}-35925_{3\frac{1}{2}}$	−13
3145.777	2	*WA*	31779.444	$4737°_{2\frac{1}{2}}-36516_{1\frac{1}{2}}$	19	3163.553	3	*WA*	31600.882	$4511°_{2\frac{1}{2}}-36112_{3\frac{1}{2}}$	118
3146.165	20	*MT*	31775.525	$14387_{4\frac{1}{2}}-46162°_{4\frac{1}{2}}$	−54	3164.153	260	*WA*	31594.890	$2382°_{4\frac{1}{2}}-33977_{3\frac{1}{2}}$	−3

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3164.745	3	*WA*	31588.980	$4523°_{4\frac{1}{2}}-36112_{3\frac{1}{2}}$	−7	3183.994	4	*MT*	31398.014	$5118°_{2\frac{1}{2}}-36516_{1\frac{1}{2}}$	22
3165.360	1	*WA*	31582.843	$13012°_{2\frac{1}{2}}-44594_{2\frac{1}{2}}$	10	3184.208	70	*PK*	31395.904	$2581°_{4\frac{1}{2}}-33977_{3\frac{1}{2}}$	21
3165.594	2	*WA*	31580.508	$6389°_{4\frac{1}{2}}-37970_{5\frac{1}{2}}$	−81	3184.330	2	*WA*	31394.701	$13256_{1\frac{1}{2}}-44651°_{1\frac{1}{2}}$	99
3166.096	3	*WA*	31575.501			3184.622	12	*MT*	31391.822	$1410°_{4\frac{1}{2}}-32802_{5\frac{1}{2}}$	−38
3166.244	130	*WA*	31574.025	$2581°_{4\frac{1}{2}}-34155_{3\frac{1}{2}}$	−28	3184.716	10	*PK*	31390.896	$7061°_{0\frac{1}{2}}-38452_{1\frac{1}{2}}$	−15
3166.557	10	*WA*	31570.904	$3363°_{2\frac{1}{2}}-34934_{2\frac{1}{2}}$	−89	3185.104	3	*WA*	31387.072		
				$15859_{4\frac{1}{2}}-47430°_{3\frac{1}{2}}$	83	3185.506	6	*WA*	31383.111	$13268_{2\frac{1}{2}}-44651°_{1\frac{1}{2}}$	27
3166.604	90	*PK*	31570.436	$2595°_{1\frac{1}{2}}-34166_{1\frac{1}{2}}$	41	3186.124	220	*AK*	31377.024	$5819°_{4\frac{1}{2}}-37196_{4\frac{1}{2}}$	−1
3166.986	3	*WA*	31566.628	$9723°_{4\frac{1}{2}}-41289_{5\frac{1}{2}}$	−7	3186.836	1	*WA*	31370.014	$7522°_{0\frac{1}{2}}-38892_{0\frac{1}{2}}$	−28
3167.226	40	*MT*	31564.236	$2595°_{1\frac{1}{2}}-34159_{0\frac{1}{2}}$	3	3187.667	20	*WA*	31361.837	$9723°_{4\frac{1}{2}}-41085_{3\frac{1}{2}}$	−41
3167.324	40	*MT*	31563.259	$3995°_{3\frac{1}{2}}-35558_{3\frac{1}{2}}$	17	3187.858	15	*PK*	31359.958	$9723°_{4\frac{1}{2}}-41083_{4\frac{1}{2}}$	0
3167.790	6	*WA*	31558.616	$0°_{3\frac{1}{2}}-31558_{3\frac{1}{2}}$	−9	3188.307	8	*WA*	31355.542		
3167.915	15	*WA*	31557.371	$3363°_{2\frac{1}{2}}-34920_{3\frac{1}{2}}$	10	3188.787	160	*MT*	31350.822	$3995°_{3\frac{1}{2}}-35346_{3\frac{1}{2}}$	0
3168.613	25	*PK*	31550.420	$7259°_{3\frac{1}{2}}-38809_{3\frac{1}{2}}$	19	3189.105	4	*WA*	31347.696	$4459°_{3\frac{1}{2}}-35807_{4\frac{1}{2}}$	0
3169.183	260	*MT*	31544.746	$5651°_{5\frac{1}{2}}-37196_{4\frac{1}{2}}$	−35	3189.265	15	*MT*	31346.123	$14252_{3\frac{1}{2}}-45598°_{3\frac{1}{2}}$	1
3170.069	12	*MT*	31535.929	$1873°_{3\frac{1}{2}}-33409_{3\frac{1}{2}}$	−33	3189.636	90	*WA*	31342.478	$2634°_{2\frac{1}{2}}-33977_{3\frac{1}{2}}$	4
3170.528	3	*WA*	31531.364	$2634°_{2\frac{1}{2}}-34166_{1\frac{1}{2}}$	−8	3190.339	180	*PK*	31335.571	$2641°_{3\frac{1}{2}}-33977_{3\frac{1}{2}}$	−9
3171.465	6	*WA*	31522.049	$3703°_{3\frac{1}{2}}-35225_{2\frac{1}{2}}$	−12	3190.394	20	*WA*	31335.031	$14827_{3\frac{1}{2}}-46162°_{4\frac{1}{2}}$	−37
3171.613	260	*MT*	31520.578	$2634°_{2\frac{1}{2}}-34155_{3\frac{1}{2}}$	−66					$3593°_{4\frac{1}{2}}-34928_{4\frac{1}{2}}$	−55
3172.005	1	*WA*	31516.682	$7878°_{3\frac{1}{2}}-39394_{3\frac{1}{2}}$	18	3190.677	1	*WA*	31332.252	$6638°_{4\frac{1}{2}}-37970_{5\frac{1}{2}}$	−21
3172.299	40	*MT*	31513.762	$2641°_{3\frac{1}{2}}-34155_{3\frac{1}{2}}$	10	3190.833	8	*WA*	31330.720	$17000_{3\frac{1}{2}}-48330°_{3\frac{1}{2}}$	−62
3172.541	6	*WA*	31511.358	$11949°_{3\frac{1}{2}}-43460_{2\frac{1}{2}}$	14	3191.185	15	*MT*	31327.264	$6521°_{1\frac{1}{2}}-37848_{2\frac{1}{2}}$	47
3173.080	1	*WA*	31506.005	$5010°_{2\frac{1}{2}}-36516_{1\frac{1}{2}}$	78	3193.126	10	*WA*	31308.222	$5924°_{1\frac{1}{2}}-37232_{1\frac{1}{2}}$	−11
3173.235	8	*WA*	31504.467	$987°_{4\frac{1}{2}}-32492_{5\frac{1}{2}}$	40					$7233°_{5\frac{1}{2}}-38541_{4\frac{1}{2}}$	−23
3173.629	15	*WA*	31500.555	$14097_{3\frac{1}{2}}-45598°_{3\frac{1}{2}}$	−51	3193.327	40	*PK*	31306.252	$9778°_{2\frac{1}{2}}-41085_{3\frac{1}{2}}$	24
3173.736	1	*WA*	31499.493	$6638°_{4\frac{1}{2}}-38137_{5\frac{1}{2}}$	70	3194.102	15	*MT*	31298.656	$6549°_{2\frac{1}{2}}-37848_{2\frac{1}{2}}$	14
3174.074	15	*PK*	31496.139	$6638°_{4\frac{1}{2}}-38134_{4\frac{1}{2}}$	−2	3194.683	10	*WA*	31292.964	$4844°_{1\frac{1}{2}}-36137_{2\frac{1}{2}}$	4
3175.059	10	*WA*	31486.369	$5437°_{3\frac{1}{2}}-36923_{4\frac{1}{2}}$	2	3194.821	650	*WA*	31291.613	$4910°_{5\frac{1}{2}}-36202_{4\frac{1}{2}}$	19
3175.581	5	*WA*	31481.193	$2563°_{5\frac{1}{2}}-34044_{4\frac{1}{2}}$	−14	3195.323	8	*WA*	31286.697	$9771_{7\frac{1}{2}}-41058°_{7\frac{1}{2}}$	39
3175.712	12	*PK*	31479.894	$5716°_{3\frac{1}{2}}-37196_{4\frac{1}{2}}$	−28	3195.546	12	*WA*	31284.513	$4523°_{4\frac{1}{2}}-35807_{4\frac{1}{2}}$	−21
3176.794	120	*PK*	31469.173	$8402°_{3\frac{1}{2}}-39871_{4\frac{1}{2}}$	8	3195.713	15	*WA*	31282.879	$7259°_{3\frac{1}{2}}-38541_{4\frac{1}{2}}$	81
3177.132	40	*WA*	31465.825	$4459°_{3\frac{1}{2}}-35925_{3\frac{1}{2}}$	16	3195.934	40	*WA*	31280.715	$2595°_{1\frac{1}{2}}-33876_{1\frac{1}{2}}$	−17
3178.107	12	*WA*	31456.172	$6517°_{2\frac{1}{2}}-37973_{3\frac{1}{2}}$	16	3196.548	3	*WA*	31274.707	$11454_{6\frac{1}{2}}-42729°_{5\frac{1}{2}}$	−38
3178.243	5	*WA*	31454.826	$13675_{2\frac{1}{2}}-45130°_{2\frac{1}{2}}$	19					$1873°_{3\frac{1}{2}}-33148_{2\frac{1}{2}}$	52
3178.316	3	*WA*	31454.104	$15134_{4\frac{1}{2}}-46588°_{5\frac{1}{2}}$	23	3197.036	5	*WA*	31269.933	$7259°_{3\frac{1}{2}}-38529_{2\frac{1}{2}}$	−12
3178.482	15	*PK*	31452.461	$1410°_{4\frac{1}{2}}-32862_{3\frac{1}{2}}$	−1	3198.136	2	*WA*	31259.179	$3508°_{0\frac{1}{2}}-34767_{1\frac{1}{2}}$	−41
3178.754	40	*MT*	31449.770	$3363°_{2\frac{1}{2}}-34813_{2\frac{1}{2}}$	−4	3198.240	6	*WA*	31258.162	$11454_{6\frac{1}{2}}-42712°_{6\frac{1}{2}}$	53
3179.336	10	*PK*	31444.013	$4844°_{1\frac{1}{2}}-36288_{0\frac{1}{2}}$	−1	3198.623	1	*WA*	31254.420	$11458_{5\frac{1}{2}}-42712°_{6\frac{1}{2}}$	−36
3180.824	40	*WA*	31429.304	$2382°_{4\frac{1}{2}}-33811_{4\frac{1}{2}}$	−16	3198.729	5	*WA*	31253.384	$5942°_{3\frac{1}{2}}-37196_{4\frac{1}{2}}$	43
3181.192	8	*WA*	31425.668	$987°_{4\frac{1}{2}}-32413_{3\frac{1}{2}}$	−66	3199.279	180	*MT*	31248.011	$5675°_{4\frac{1}{2}}-36923_{4\frac{1}{2}}$	−14
3181.378	6	*WA*	31423.831	$6549°_{2\frac{1}{2}}-37973_{3\frac{1}{2}}$	−36	3200.515	40	*WA*	31235.944	$4322°_{2\frac{1}{2}}-35558_{3\frac{1}{2}}$	−49
3181.474	2	*WA*	31422.883	$1873°_{3\frac{1}{2}}-33296_{4\frac{1}{2}}$	12	3200.625	6	*MT*	31234.870	$0°_{3\frac{1}{2}}-31234_{2\frac{1}{2}}$	−8
3181.591	10	*WA*	31421.727	$13527_{4\frac{1}{2}}-44949°_{4\frac{1}{2}}$	−44	3200.736	1	*WA*	31233.787	$5283°_{0\frac{1}{2}}-36516_{1\frac{1}{2}}$	19
3181.840	6	*WA*	31419.269	$9778°_{2\frac{1}{2}}-41198_{2\frac{1}{2}}$	−53	3200.867	10	*WA*	31232.509	$11340°_{3\frac{1}{2}}-42573_{3\frac{1}{2}}$	−83
3181.956	6	*WA*	31418.123	$5924°_{1\frac{1}{2}}-37342_{2\frac{1}{2}}$	1	3201.105	15	*MT*	31230.187	$3995°_{3\frac{1}{2}}-35225_{2\frac{1}{2}}$	−8
3182.195	15	*PK*	31415.764	$2879°_{5\frac{1}{2}}-34295_{4\frac{1}{2}}$	9	3201.421	12	*WA*	31227.105	$5969°_{5\frac{1}{2}}-37196_{4\frac{1}{2}}$	−26
3182.662	20	*MT*	31411.154	$2595°_{1\frac{1}{2}}-34006_{0\frac{1}{2}}$	−23	3201.712	900	*WA*	31224.266	$6913°_{6\frac{1}{2}}-38137_{5\frac{1}{2}}$	−23
3183.093	5	*MT*	31406.901	$5437°_{3\frac{1}{2}}-36844_{2\frac{1}{2}}$	18	3202.244	10	*WA*	31219.079	$8175°_{2\frac{1}{2}}-39394_{3\frac{1}{2}}$	−50
3183.523	440	*MT*	31402.659	$4523°_{4\frac{1}{2}}-35925_{3\frac{1}{2}}$	10	3202.356	10	*MT*	31217.987	$5675°_{4\frac{1}{2}}-36893_{3\frac{1}{2}}$	−19
3183.844	4	*WA*	31399.493	$5942°_{3\frac{1}{2}}-37342_{2\frac{1}{2}}$	−35	3202.443	5	*WA*	31217.139	$3703°_{3\frac{1}{2}}-34920_{3\frac{1}{2}}$	−54

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3202.653	4	*WA*	31215.093			3222.853	6	*WA*	31019.451		
3202.906	15	*MT*	31212.627	$2595°_{1\,1/2} - 33808_{2\,1/2}$	−45	3223.362	40	*WA*	31014.553	$7818°_{1\,1/2} - 38832_{2\,1/2}$	−8
3203.053	2	*WA*	31211.194	$14387_{4\,1/2} - 45598°_{3\,1/2}$	6	3223.519	8	*WA*	31013.043	$6517°_{2\,1/2} - 37530_{1\,1/2}$	29
3203.144	6	*WA*	31210.308	$987°_{4\,1/2} - 32197_{4\,1/2}$	−62	3223.905	15	*WA*	31009.330	$6521°_{1\,1/2} - 37530_{1\,1/2}$	29
3203.388	3	*WA*	31207.930	$0°_{3\,1/2} - 31207_{3\,1/2}$	4	3224.295	3	*MT*	31005.579	$5283°_{0\,1/2} - 36288_{0\,1/2}$	−50
3203.624	2	*WA*	31205.632	$1873°_{3\,1/2} - 33079_{3\,1/2}$	54	3224.834	10	*WA*	31000.397	$10058_{6\,1/2} - 41058°_{7\,1/2}$	9
3204.160	30	*MT*	31200.412	$12260°_{3\,1/2} - 43460_{2\,1/2}$	−32	3225.301	1	*WA*	30995.908	$4201°_{1\,1/2} - 35197_{1\,1/2}$	−38
3204.353	15	*PK*	31198.533	$6389°_{4\,1/2} - 37588_{3\,1/2}$	2	3225.485	4	*WA*	30994.140	$12466°_{1\,1/2} - 43460_{2\,1/2}$	38
3204.918	10	*PK*	31193.033	$4523°_{4\,1/2} - 35716_{5\,1/2}$	−16	3225.672	300	*MT*	30992.344	$8402°_{3\,1/2} - 39394_{3\,1/2}$	19
3205.406	12	*WA*	31188.284	$4737°_{2\,1/2} - 35925_{3\,1/2}$	−24	3226.036	8	*MT*	30988.847	$1873°_{3\,1/2} - 32862_{3\,1/2}$	14
3205.954	90	*WA*	31182.953	$7011_{4\,1/2} - 38194°_{4\,1/2}$	29	3226.895	2	*WA*	30980.598	$17171°_{5\,1/2} - 48151_{4\,1/2}$	104
3206.035	8	*WA*	31182.165							$6549°_{2\,1/2} - 37530_{1\,1/2}$	−123
3206.509	15	*WA*	31177.556	$5716°_{3\,1/2} - 36893_{3\,1/2}$	2	3227.114	650	*MT*	30978.496	$2595°_{1\,1/2} - 33574_{1\,1/2}$	−4
3206.915	15	*WA*	31173.609	$2634°_{2\,1/2} - 33808_{2\,1/2}$	−41	3228.034	25	*PK*	30969.667	$3363°_{2\,1/2} - 34333_{2\,1/2}$	−3
3207.286	10	*WA*	31170.003	$2641°_{3\,1/2} - 33811_{4\,1/2}$	−4	3228.199	2	*WA*	30968.084	$2563°_{5\,1/2} - 33531_{6\,1/2}$	−70
3207.625	15	*WA*	31166.709	$2641°_{3\,1/2} - 33808_{2\,1/2}$	−48	3229.122	90	*MT*	30959.232	$4266°_{3\,1/2} - 35225_{2\,1/2}$	−26
3209.048	6	*WA*	31152.889	$8702°_{1\,1/2} - 39855_{0\,1/2}$	−65	3229.363	220	*MT*	30956.922	$2595°_{1\,1/2} - 33552_{2\,1/2}$	−15
3209.570	6	*WA*	31147.823	$13503_{0\,1/2} - 44651°_{1\,1/2}$	28	3229.585	12	*PK*	30954.794	$5969°_{5\,1/2} - 36923_{4\,1/2}$	13
3210.094	8	*MT*	31142.738	$8896_{5\,1/2} - 40039°_{6\,1/2}$	−56	3230.023	4	*WA*	30950.597		
3210.951	90	*WA*	31134.427	$6517°_{2\,1/2} - 37652_{2\,1/2}$	−44	3230.082	40	*WA*	30950.031	$987°_{4\,1/2} - 31937_{3\,1/2}$	−10
3211.333	10	*WA*	31130.723	$6521°_{1\,1/2} - 37652_{2\,1/2}$	−35	3230.284	10	*WA*	30948.096	$8131_{4\,1/2} - 39079°_{5\,1/2}$	15
3211.606	8	*WA*	31128.077	$5716°_{3\,1/2} - 36844_{2\,1/2}$	−11	3231.239	440	*WA*	30938.950	$3995°_{3\,1/2} - 34934_{2\,1/2}$	−12
3212.320	3	*MT*	31121.158			3231.807	5	*WA*	30933.512	$3995°_{3\,1/2} - 34928_{4\,1/2}$	3
3212.481	20	*WA*	31119.599	$7818°_{1\,1/2} - 38937_{1\,1/2}$	−69	3231.980	6	*WA*	30931.856	$2879°_{5\,1/2} - 33811_{4\,1/2}$	−15
3213.059	10	*WA*	31114.001	$8280°_{2\,1/2} - 39394_{3\,1/2}$	−45	3232.054	1	*WA*	30931.149	$7878°_{3\,1/2} - 38809_{3\,1/2}$	1
3213.398	1	*WA*	31110.719	$12057°_{2\,1/2} - 43167_{1\,1/2}$	−53	3232.141	1	*WA*	30930.316	$7522°_{0\,1/2} - 38452_{1\,1/2}$	24
3213.530	4	*WA*	31109.441			3232.297	15	*WA*	30928.823	$5964°_{3\,1/2} - 36893_{3\,1/2}$	−50
3214.024	15	*WA*	31104.660	$5819°_{4\,1/2} - 36923_{4\,1/2}$	−15	3232.476	4	*WA*	30927.111		
3214.250	12	*WA*	31102.472	$7092_{5\,1/2} - 38194°_{4\,1/2}$	10	3232.665	5	*WA*	30925.302	$3995°_{3\,1/2} - 34920_{3\,1/2}$	−25
3214.630	3	*WA*	31098.796	$4459°_{3\,1/2} - 35558_{3\,1/2}$	−33	3232.875	8	*WA*	30923.294	$10274°_{3\,1/2} - 41198_{2\,1/2}$	−43
3214.883	3	*WA*	31096.349	$7713°_{4\,1/2} - 38809_{3\,1/2}$	−37	3233.208	5	*WA*	30920.109	$5924°_{1\,1/2} - 36844_{2\,1/2}$	8
3215.089	10	*WA*	31094.356	$6521°_{1\,1/2} - 37615_{0\,1/2}$	−45	3233.441	130	*MT*	30917.881	$2634°_{2\,1/2} - 33552_{2\,1/2}$	−34
3215.896	10	*WA*	31086.554	$7746°_{2\,1/2} - 38832_{2\,1/2}$	30	3233.773	15	*MT*	30914.707	$7059°_{4\,1/2} - 37973_{3\,1/2}$	3
3216.225	5	*WA*	31083.374	$10114°_{2\,1/2} - 41198_{2\,1/2}$	−51	3234.161	650	*MT*	30910.998	$2641°_{3\,1/2} - 33552_{2\,1/2}$	−24
3216.587	8	*WA*	31079.876	$4266°_{3\,1/2} - 35346_{3\,1/2}$	−8	3234.274	5	*MT*	30909.918	$2140°_{0\,1/2} - 33050_{1\,1/2}$	119
3216.715	12	*WA*	31078.639	$7059°_{4\,1/2} - 38137_{5\,1/2}$	29	3234.495	10	*WA*	30907.806	$1410°_{4\,1/2} - 32318_{3\,1/2}$	−64
3217.130	15	*PK*	31074.630	$5819°_{4\,1/2} - 36893_{3\,1/2}$	−26	3234.887	300	*WA*	30904.061	$7233°_{5\,1/2} - 38137_{5\,1/2}$	6
3217.522	20	*MT*	31070.844	$6517°_{2\,1/2} - 37588_{3\,1/2}$	−9	3235.011	40	*MT*	30902.877	$4322°_{2\,1/2} - 35225_{2\,1/2}$	−70
3217.866	4	*WA*	31067.523	$8804°_{4\,1/2} - 39871_{4\,1/2}$	−85	3235.670	70	*MT*	30896.583	$4910°_{5\,1/2} - 35807_{4\,1/2}$	−21
3218.377	180	*PK*	31062.591	$3363°_{2\,1/2} - 34426_{2\,1/2}$	−18	3236.735	360	*MT*	30886.417	$4459°_{3\,1/2} - 35346_{3\,1/2}$	7
3218.944	650	*MT*	31057.119	$6913°_{6\,1/2} - 37970_{5\,1/2}$	−20	3237.917	1	*WA*	30875.142	$4322°_{2\,1/2} - 35197_{1\,1/2}$	11
3219.948	3	*WA*	31047.436	$4511°_{2\,1/2} - 35558_{3\,1/2}$	−8	3238.680	2	*WA*	30867.869	$12466°_{1\,1/2} - 43334_{0\,1/2}$	−34
3220.400	12	*PK*	31043.078	$0°_{3\,1/2} - 31043_{2\,1/2}$	−31	3239.658	2	*WA*	30858.551	$14739_{2\,1/2} - 45598°_{3\,1/2}$	11
3220.871	90	*MT*	31038.539	$6549°_{2\,1/2} - 37588_{3\,1/2}$	−25	3240.406	5	*WA*	30851.427	$17300°_{3\,1/2} - 48151_{4\,1/2}$	−1
3221.061	6	*WA*	31036.708	$2140°_{0\,1/2} - 33177_{0\,1/2}$	4	3240.672	4	*WA*	30848.895		
3221.171	800	*MT*	31035.648	$4523°_{4\,1/2} - 35558_{3\,1/2}$	−20	3241.214	15	*MT*	30843.737	$7293°_{6\,1/2} - 38137_{5\,1/2}$	−6
3221.470	5	*WA*	31032.768	$14097_{3\,1/2} - 45130°_{2\,1/2}$	−66	3242.129	15	*PK*	30835.032	$4511°_{2\,1/2} - 35346_{3\,1/2}$	8
3221.902	3	*WA*	31028.607	$15134_{4\,1/2} - 46162°_{4\,1/2}$	−34	3242.788	6	*WA*	30828.766	$7713°_{4\,1/2} - 38541_{4\,1/2}$	−17
3222.003	3	*WA*	31027.634	$2382°_{4\,1/2} - 33409_{3\,1/2}$	−16	3243.214	6	*WA*	30824.717	$6517°_{2\,1/2} - 37342_{2\,1/2}$	9
3222.407	40	*WA*	31023.745	$4201°_{1\,1/2} - 35225_{2\,1/2}$	−17	3243.370	360	*MT*	30823.235	$4523°_{4\,1/2} - 35346_{3\,1/2}$	−13

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3243.573	8	*WA*	30821.306	$4737°_{2\frac{1}{2}} - 35558_{3\frac{1}{2}}$	−22	3265.145	6	*WA*	30617.684	$19946°_{1\frac{1}{2}} - 50564_{2\frac{1}{2}}$	−51
3243.949	6	*WA*	30817.733	$3995°_{3\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−8	3265.423	40	*MT*	30615.077	$7522°_{5\frac{1}{2}} - 38137_{5\frac{1}{2}}$	17
3244.747	2	*WA*	30810.154	$13784°_{1\frac{1}{2}} - 44594_{2\frac{1}{2}}$	60	3265.568	10	*WA*	30613.718	$3363°_{2\frac{1}{2}} - 33977_{3\frac{1}{2}}$	5
3244.943	10	*WA*	30808.293	$10274°_{3\frac{1}{2}} - 41083_{4\frac{1}{2}}$	−29	3265.679	8	*WA*	30612.678	$4844°_{1\frac{1}{2}} - 35457_{1\frac{1}{2}}$	4
3245.124	10	*WA*	30806.575			3265.828	15	*WA*	30611.281	$4201°_{1\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−27
3245.166	90	*MT*	30806.176	$6389°_{4\frac{1}{2}} - 37196_{4\frac{1}{2}}$	−20	3266.865	5	*WA*	30601.564	$14049_{1\frac{1}{2}} - 44651°_{1\frac{1}{2}}$	23
3245.544	15	*PK*	30802.588	$3363°_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	−23	3267.237	12	*WA*	30598.080	$4322°_{2\frac{1}{2}} - 34920_{3\frac{1}{2}}$	0
3245.684	5	*WA*	30801.260	$8278_{5\frac{1}{2}} - 39079°_{5\frac{1}{2}}$	16	3267.832	3	*WA*	30592.509	$5924°_{1\frac{1}{2}} - 36516_{1\frac{1}{2}}$	−84
3246.672	180	*PK*	30791.887	$3363°_{2\frac{1}{2}} - 34155_{3\frac{1}{2}}$	3	3267.912	4	*WA*	30591.760	$3703°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−95
3247.118	6	*WA*	30787.658	$1410°_{4\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−19	3268.022	5	*WA*	30590.730	$8804°_{4\frac{1}{2}} - 39394_{3\frac{1}{2}}$	−38
3247.416	2	*WA*	30784.833	$15803_{4\frac{1}{2}} - 46588°_{5\frac{1}{2}}$	12	3268.160	4	*WA*	30589.439	$7259°_{3\frac{1}{2}} - 37848_{2\frac{1}{2}}$	−35
3247.898	6	*WA*	30780.264	$2879°_{5\frac{1}{2}} - 33659_{5\frac{1}{2}}$	−8	3268.823	1	*WA*	30583.235	$10274°_{3\frac{1}{2}} - 40858_{4\frac{1}{2}}$	1
3248.065	8	*WA*	30778.682	$17851°_{0\frac{1}{2}} - 48630_{1\frac{1}{2}}$	25	3269.124	10	*PK*	30580.419	$987°_{4\frac{1}{2}} - 31568_{4\frac{1}{2}}$	11
3248.429	15	*WA*	30775.233	$2634°_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	2	3270.129	15	*PK*	30571.021	$987°_{4\frac{1}{2}} - 31558_{3\frac{1}{2}}$	6
3249.164	90	*PK*	30768.272	$2641°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−65	3270.690	10	*WA*	30565.778	$4201°_{1\frac{1}{2}} - 34767_{1\frac{1}{2}}$	−19
3249.427	40	*PK*	30765.781	$4459°_{3\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−2	3271.157	90	*WA*	30561.414	$3593°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	−14
3249.498	5	*WA*	30765.109	$5437°_{3\frac{1}{2}} - 36202_{4\frac{1}{2}}$	−25	3271.548	90	*PK*	30557.762	$6638°_{4\frac{1}{2}} - 37196_{4\frac{1}{2}}$	−116
3249.831	6	*WA*	30761.957	$8175°_{2\frac{1}{2}} - 38937_{1\frac{1}{2}}$	4	3271.961	15	*MT*	30553.905	$7061°_{0\frac{1}{2}} - 37615_{0\frac{1}{2}}$	9
3251.370	4	*MT*	30747.397	$7522°_{0\frac{1}{2}} - 38269_{0\frac{1}{2}}$	−118	3272.064	25	*WA*	30552.943	$2595°_{1\frac{1}{2}} - 33148_{2\frac{1}{2}}$	−1
3251.725	3	*WA*	30744.040	$10454°_{1\frac{1}{2}} - 41198_{2\frac{1}{2}}$	3	3272.253	900	*MT*	30551.178	$5651°_{5\frac{1}{2}} - 36202_{4\frac{1}{2}}$	−21
3251.882	15	*PK*	30742.556	$7061°_{0\frac{1}{2}} - 37804_{1\frac{1}{2}}$	−39	3272.606	10	*WA*	30547.883	$5010°_{2\frac{1}{2}} - 35558_{3\frac{1}{2}}$	51
3252.108	2	*WA*	30740.419	$11007°_{1\frac{1}{2}} - 41748_{1\frac{1}{2}}$	−60	3272.724	10	*WA*	30546.782	$4266°_{3\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−22
3252.482	130	*AK*	30736.885	$7233°_{5\frac{1}{2}} - 37970_{5\frac{1}{2}}$	−19	3273.516	8	*WA*	30539.391	$1873°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−20
3252.982	5	*WA*	30732.160	$9778°_{2\frac{1}{2}} - 40511_{1\frac{1}{2}}$	20	3273.926	8	*WA*	30535.567		
3253.342	10	*MT*	30728.760	$15859_{4\frac{1}{2}} - 46588°_{5\frac{1}{2}}$	−7	3274.112	10	*WA*	30533.832	$6389°_{4\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−14
3254.013	130	*WA*	30722.424	$3703°_{3\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−18	3274.616	10	*WA*	30529.133		
3254.287	6	*WA*	30719.837	$3793°_{6\frac{1}{2}} - 34513_{6\frac{1}{2}}$	3	3274.660	8	*WA*	30528.723		
				$2140°_{0\frac{1}{2}} - 32860_{0\frac{1}{2}}$	−23	3274.864	300	*MT*	30526.821	$5675°_{4\frac{1}{2}} - 36202_{4\frac{1}{2}}$	28
3254.861	12	*WA*	30714.420	$4511°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	21	3275.567	5	*WA*	30520.270		
3255.215	8	*WA*	30711.080	$6521°_{1\frac{1}{2}} - 37232_{1\frac{1}{2}}$	−25	3276.246	130	*WA*	30513.945	$2634°_{2\frac{1}{2}} - 33148_{2\frac{1}{2}}$	22
3256.224	5	*PK*	30701.563	$3593°_{4\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−4	3276.356	8	*WA*	30512.920	$3363°_{2\frac{1}{2}} - 33876_{1\frac{1}{2}}$	−29
3256.365	1	*WA*	30700.234	$5437°_{3\frac{1}{2}} - 36137_{2\frac{1}{2}}$	52	3276.623	2	*WA*	30510.434	$18147°_{2\frac{1}{2}} - 48657_{3\frac{1}{2}}$	103
3256.681	20	*WA*	30697.255	$2382°_{4\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−10	3277.931	10	*WA*	30498.260	$2581°_{4\frac{1}{2}} - 33079_{3\frac{1}{2}}$	5
3257.132	8	*WA*	30693.005	$11340°_{3\frac{1}{2}} - 42033_{2\frac{1}{2}}$	−51	3277.989	4	*WA*	30497.720	$2140°_{0\frac{1}{2}} - 32638_{1\frac{1}{2}}$	47
3257.813	6	*MT*	30686.589	$4511°_{2\frac{1}{2}} - 35197_{1\frac{1}{2}}$	7	3278.762	2	*WA*	30490.530	$4322°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	36
3258.247	1	*WA*	30682.502	$6549°_{2\frac{1}{2}} - 37232_{1\frac{1}{2}}$	−27	3279.007	130	*PK*	30488.252	$5437°_{3\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−7
3258.874	90	*MT*	30676.599	$7293°_{6\frac{1}{2}} - 37970_{5\frac{1}{2}}$	5					$4737°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−30
3259.787	20	*WA*	30668.007	$4266°_{3\frac{1}{2}} - 34934_{2\frac{1}{2}}$	−18	3279.205	5	*WA*	30486.411	$5716°_{3\frac{1}{2}} - 36202_{4\frac{1}{2}}$	71
3260.320	6	*WA*	30662.994	$8169°_{1\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−16	3279.841	180	*WA*	30480.500	$2382°_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−20
3260.974	180	*AK*	30656.845	$8280°_{2\frac{1}{2}} - 38937_{1\frac{1}{2}}$	−24	3280.484	70	*WA*	30474.525	$4459°_{3\frac{1}{2}} - 34934_{2\frac{1}{2}}$	−25
				$8175°_{2\frac{1}{2}} - 38832_{2\frac{1}{2}}$	0						
						3280.668	6	*MT*	30472.816		
3261.116	8	*WA*	30655.510	$8423_{6\frac{1}{2}} - 39079°_{5\frac{1}{2}}$	−115	3281.095	40	*MT*	30468.851	$7061°_{0\frac{1}{2}} - 37530_{1\frac{1}{2}}$	56
3261.238	10	*WA*	30654.363	$4266°_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−27	3281.587	3	*MT*	30464.283	$15134_{4\frac{1}{2}} - 45598°_{3\frac{1}{2}}$	32
3261.524	5	*WA*	30651.675	$2879°_{5\frac{1}{2}} - 33531_{6\frac{1}{2}}$	−17	3281.951	6	*WA*	30460.904	$4459°_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−11
3261.629	6	*PK*	30650.688	$7878°_{3\frac{1}{2}} - 38529_{2\frac{1}{2}}$	−4	3281.996	6	*WA*	30460.486	$4737°_{2\frac{1}{2}} - 35197_{1\frac{1}{2}}$	20
3262.138	8	*MT*	30645.906	$11387°_{3\frac{1}{2}} - 42033_{2\frac{1}{2}}$	−17	3283.067	1	*WA*	30450.550	$3593°_{4\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−8
3263.070	8	*WA*	30637.153	$0°_{3\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−3	3283.175	8	*WA*	30449.549	$7202°_{2\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−12
3263.339	10	*WA*	30634.628	$7818°_{1\frac{1}{2}} - 38452_{1\frac{1}{2}}$	25	3283.347	90	*WA*	30447.953	$7522°_{5\frac{1}{2}} - 37970_{5\frac{1}{2}}$	43
3263.445	130	*MT*	30633.633	$8175°_{2\frac{1}{2}} - 38809_{3\frac{1}{2}}$	20	3283.678	60	*PK*	30444.884	$2634°_{2\frac{1}{2}} - 33079_{3\frac{1}{2}}$	38
3263.884	180	*MT*	30629.513	$3703°_{3\frac{1}{2}} - 34333_{2\frac{1}{2}}$	9					$3363°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−5

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3284.218	40	*MT*	30439.879	$5118°_{2\frac{1}{2}}-35558_{3\frac{1}{2}}$	−16	3298.939	2	*MB*	30304.050	$8531_{3\frac{1}{2}}-38835°_{2\frac{1}{2}}$	−5
3284.422	10	*WA*	30437.988	$2641°_{3\frac{1}{2}}-33079_{3\frac{1}{2}}$	35	3299.024	7	*MB*	30303.269	$15859_{4\frac{1}{2}}-46162°_{4\frac{1}{2}}$	−59
3284.606	12	*WA*	30436.283	$5675°_{4\frac{1}{2}}-36112_{3\frac{1}{2}}$	25	3299.164	5	*MB*	30301.983	$4511°_{2\frac{1}{2}}-34813_{2\frac{1}{2}}$	39
3285.214	300	*WA*	30430.650	$3995°_{3\frac{1}{2}}-34426_{2\frac{1}{2}}$	74	3299.816	5	*MB*	30295.996		
3285.786	5	*WA*	30425.353	$0°_{3\frac{1}{2}}-30425_{2\frac{1}{2}}$	4	3299.989	90	*WA*	30294.408	$6549°_{2\frac{1}{2}}-36844_{2\frac{1}{2}}$	11
3285.864	1	*WA*	30424.631	$7713°_{4\frac{1}{2}}-38137_{5\frac{1}{2}}$	38	3300.151	200	*AK*	30292.921	$5819°_{4\frac{1}{2}}-36112_{3\frac{1}{2}}$	13
3286.029	90	*MT*	30423.103	$4511°_{2\frac{1}{2}}-34934_{2\frac{1}{2}}$	−62	3300.443	7	*MB*	30290.241		
3286.216	8	*WA*	30421.372	$5716°_{3\frac{1}{2}}-36137_{2\frac{1}{2}}$	−15	3300.720	7	*MB*	30287.699		
3286.379	10	*WA*	30419.863	$2382°_{4\frac{1}{2}}-32802_{5\frac{1}{2}}$	−55	3300.953	20	*MB*	30285.561	$6638°_{4\frac{1}{2}}-36923_{4\frac{1}{2}}$	30
3286.676	8	*WA*	30417.114	$2879°_{5\frac{1}{2}}-33296_{4\frac{1}{2}}$	5	3301.094	2	*MB*	30284.268		
3286.828	8	*WA*	30415.708	$2634°_{2\frac{1}{2}}-33050_{1\frac{1}{2}}$	83	3301.227	18	*MB*	30283.048	$8169°_{1\frac{1}{2}}-38452_{1\frac{1}{2}}$	−3
3287.396	2	*PK*	30410.453	$2634°_{2\frac{1}{2}}-33045_{2\frac{1}{2}}$	24	3301.341	2	*MB*	30282.002	$7522°_{0\frac{1}{2}}-37804_{1\frac{1}{2}}$	26
3287.790	6	*WA*	30406.808	$8402°_{3\frac{1}{2}}-38809_{3\frac{1}{2}}$	1	3301.796	2	*MB*	30277.829		
3287.882	20	*MB*	30405.958	$4523°_{4\frac{1}{2}}-34928_{4\frac{1}{2}}$	22	3301.900	20	*MB*	30276.876	$8175°_{2\frac{1}{2}}-38452_{1\frac{1}{2}}$	−10
3288.145	20	*MB*	30403.526	$2641°_{3\frac{1}{2}}-33045_{2\frac{1}{2}}$	−9	3302.509	2	*MB*	30271.292	$15593_{6\frac{1}{2}}-45864°_{5\frac{1}{2}}$	3
3288.202	25	*MB*	30402.999	$14727_{1\frac{1}{2}}-45130°_{2\frac{1}{2}}$	10	3302.590	2	*MB*	30270.550		
3288.346	15	*MB*	30401.667	$12057°_{2\frac{1}{2}}-42458_{1\frac{1}{2}}$	32	3302.913	20	*MB*	30267.590	$9771_{7\frac{1}{2}}-40039°_{6\frac{1}{2}}$	22
3288.770	40	*MT*	30397.748	$4523°_{4\frac{1}{2}}-34920_{3\frac{1}{2}}$	−6	3303.137	2	*MB*	30265.538		
3288.938	5	*MB*	30396.195	$10114°_{2\frac{1}{2}}-40511_{1\frac{1}{2}}$	−48	3303.219	25	*MB*	30264.786	$1873°_{3\frac{1}{2}}-32138_{2\frac{1}{2}}$	22
3289.279	25	*MB*	30393.044	$7259°_{3\frac{1}{2}}-37652_{2\frac{1}{2}}$	29	3303.670	8	*WA*	30260.655	$7713°_{4\frac{1}{2}}-37973_{3\frac{1}{2}}$	−31
3289.523	10	*MB*	30390.790	$14739_{2\frac{1}{2}}-45130°_{2\frac{1}{2}}$	22	3303.765	18	*MB*	30259.785	$5942°_{3\frac{1}{2}}-36202_{4\frac{1}{2}}$	26
3290.040	3	*WA*	30386.014	$7202°_{2\frac{1}{2}}-37588_{3\frac{1}{2}}$	71	3304.021	10	*MB*	30257.440	$7713°_{4\frac{1}{2}}-37970_{5\frac{1}{2}}$	−2
3290.327	90	*MB*	30383.364	$3593°_{4\frac{1}{2}}-33977_{3\frac{1}{2}}$	103	3304.132	10	*MB*	30256.424	$4511°_{2\frac{1}{2}}-34767_{1\frac{1}{2}}$	−9
3290.577	40	*WA*	30381.056	$4844°_{1\frac{1}{2}}-35225_{2\frac{1}{2}}$	44	3304.487	2	*MB*	30253.173		
3291.751	2	*MB*	30370.221	$5437°_{3\frac{1}{2}}-35807_{4\frac{1}{2}}$	75	3304.648	7	*WA*	30251.699	$7278°_{1\frac{1}{2}}-37530_{1\frac{1}{2}}$	−11
3292.001	10	*WA*	30367.915	$3508°_{0\frac{1}{2}}-33876_{1\frac{1}{2}}$	8	3304.805	25	*MB*	30250.262		
3292.100	7	*MB*	30367.001	$2140°_{0\frac{1}{2}}-32507_{1\frac{1}{2}}$	52	3304.843	220	*WA*	30249.915	$5675°_{4\frac{1}{2}}-35925_{3\frac{1}{2}}$	−3
3292.302	5	*MB*	30365.138	$10924°_{4\frac{1}{2}}-41289_{5\frac{1}{2}}$	44	3305.041	25	*MB*	30248.103	$8280°_{2\frac{1}{2}}-38529_{2\frac{1}{2}}$	28
3292.368	5	*MB*	30364.529	$5924°_{1\frac{1}{2}}-36288_{0\frac{1}{2}}$	75	3305.331	10	*MB*	30245.449		
3292.551	2	*MB*	30362.842			3305.519	2	*MB*	30243.728		
3292.925	25	*MB*	30359.394	$15803_{4\frac{1}{2}}-46162°_{4\frac{1}{2}}$	12	3305.585	2	*MB*	30243.125		
3293.580	40	*MB*	30353.356	$4459°_{3\frac{1}{2}}-34813_{2\frac{1}{2}}$	27	3306.045	20	*MB*	30238.917	$2563°_{5\frac{1}{2}}-32802_{5\frac{1}{2}}$	−14
3294.416	5	*MB*	30345.654			3306.180	15	*MB*	30237.682	$5964°_{3\frac{1}{2}}-36202_{4\frac{1}{2}}$	21
3294.606	15	*MT*	30343.904	$6549°_{2\frac{1}{2}}-36893_{3\frac{1}{2}}$	42	3306.438	10	*MB*	30235.323	$8702°_{1\frac{1}{2}}-38937_{1\frac{1}{2}}$	−48
3294.926	25	*MB*	30340.957			3306.637	130	*WA*	30233.503	$5969°_{5\frac{1}{2}}-36202_{4\frac{1}{2}}$	−46
3294.948	20	*WA*	30340.754	$3703°_{3\frac{1}{2}}-34044_{4\frac{1}{2}}$	−92	3306.750	5	*MB*	30232.470		
3295.167	10	*MB*	30338.738			3307.225	130	*MB*	30228.128	$2634°_{2\frac{1}{2}}-32862_{3\frac{1}{2}}$	27
3295.285	220	*WA*	30337.652	$3995°_{3\frac{1}{2}}-34333_{2\frac{1}{2}}$	14	3307.293	7	*MB*	30227.507	$5118°_{2\frac{1}{2}}-35346_{3\frac{1}{2}}$	31
3296.172	130	*MB*	30329.488	$7259°_{3\frac{1}{2}}-37588_{3\frac{1}{2}}$	90	3307.985	50	*MB*	30221.184	$9634°_{1\frac{1}{2}}-39855_{0\frac{1}{2}}$	−28
3296.483	1	*WA*	30326.627	$6517°_{2\frac{1}{2}}-36844_{2\frac{1}{2}}$	−58					$2641°_{3\frac{1}{2}}-32862_{3\frac{1}{2}}$	−23
3296.574	12	*MB*	30325.790			3308.014	140	*MB*	30220.918	$2581°_{4\frac{1}{2}}-32802_{5\frac{1}{2}}$	11
3296.763	15	*WA*	30324.051	$1873°_{3\frac{1}{2}}-32197_{4\frac{1}{2}}$	3	3308.077	40	*MB*	30220.343	$987°_{4\frac{1}{2}}-31207_{3\frac{1}{2}}$	27
3296.876	180	*WA*	30323.012	$6521°_{1\frac{1}{2}}-36844_{2\frac{1}{2}}$	39	3308.371	2	*MB*	30217.658	$3593°_{4\frac{1}{2}}-33811_{4\frac{1}{2}}$	−26
3297.663	12	*MB*	30315.775			3308.514	2	*MB*	30216.351		
3297.896	5	*MB*	30313.634			3308.570	2	*MB*	30215.840		
3297.952	15	*MB*	30313.119	$12260°_{3\frac{1}{2}}-42573_{3\frac{1}{2}}$	16	3308.688	15	*MB*	30214.763	$5010°_{2\frac{1}{2}}-35225_{2\frac{1}{2}}$	−22
3298.074	2	*MB*	30311.998			3308.840	12	*MB*	30213.375	$5924°_{1\frac{1}{2}}-36137_{2\frac{1}{2}}$	−24
3298.251	10	*MB*	30310.371			3308.978	5	*MB*	30212.115		
3298.344	30	*WA*	30309.516	$4203°_{6\frac{1}{2}}-34513_{6\frac{1}{2}}$	−17	3309.132	20	*WA*	30210.709	$3363°_{2\frac{1}{2}}-33574_{1\frac{1}{2}}$	−8
3298.595	2	*MB*	30307.210			3309.265	90	*MB*	30209.495	$5716°_{3\frac{1}{2}}-35925_{3\frac{1}{2}}$	29

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3309.500	12	*MB*	30207.349	$12365°_{4\frac{1}{2}}-42573_{3\frac{1}{2}}$	−35	3320.222	12	*MB*	30109.804	$2382°_{4\frac{1}{2}}-32492_{5\frac{1}{2}}$	12
3309.822	2	*MB*	30204.411			3320.426	40	*WA*	30107.954	$3703°_{3\frac{1}{2}}-33811_{4\frac{1}{2}}$	−18
3309.842	18	*MB*	30204.228	$9634°_{1\frac{1}{2}}-39838_{2\frac{1}{2}}$	−30	3320.553	20	*WA*	30106.803	$5118°_{2\frac{1}{2}}-35225_{2\frac{1}{2}}$	−46
3310.288	2	*MB*	30200.159			3320.781	30	*MB*	30104.736	$3703°_{3\frac{1}{2}}-33808_{2\frac{1}{2}}$	13
3310.585	2	*MB*	30197.450			3320.931	30	*MB*	30103.376	$4322°_{2\frac{1}{2}}-34426_{2\frac{1}{2}}$	47
3310.630	18	*MB*	30197.039	$4737°_{2\frac{1}{2}}-34934_{2\frac{1}{2}}$	−10	3321.247	2	*MB*	30100.512		
3310.665	2	*MB*	30196.720	$9198°_{3\frac{1}{2}}-39394_{3\frac{1}{2}}$	53	3321.276	15	*MB*	30100.249	$8169°_{1\frac{1}{2}}-38269_{0\frac{1}{2}}$	−26
3310.734	2	*MB*	30196.091			3321.559	5	*MB*	30097.685		
3310.875	40	*MB*	30194.805	$5942°_{3\frac{1}{2}}-36137_{2\frac{1}{2}}$	0	3321.804	5	*MB*	30095.465	$7878°_{3\frac{1}{2}}-37973_{3\frac{1}{2}}$	17
3311.395	25	*MB*	30190.063	$8702°_{1\frac{1}{2}}-38892_{0\frac{1}{2}}$	7	3322.258	5	*MB*	30091.352	$5716°_{3\frac{1}{2}}-35807_{4\frac{1}{2}}$	1
3311.492	130	*MB*	30189.179	$3363°_{2\frac{1}{2}}-33552_{2\frac{1}{2}}$	24	3322.315	12	*MB*	30090.836		
3311.732	10	*WA*	30186.991	$5010°_{2\frac{1}{2}}-35197_{1\frac{1}{2}}$	22	3322.527	5	*MB*	30088.916		
3311.770	2	*MB*	30186.645			3322.628	20	*MB*	30088.002	$987°_{4\frac{1}{2}}-31075_{4\frac{1}{2}}$	10
3312.191	20	*MB*	30182.808			3322.818	2	*MB*	30086.281		
3312.216	180	*MB*	30182.580	$8896_{5\frac{1}{2}}-39079°_{5\frac{1}{2}}$	12	3322.867	2	*MB*	30085.837		
3312.322	2	*MB*	30181.615			3322.921	12	*MB*	30085.349	$11015_{3\frac{1}{2}}-41100°_{2\frac{1}{2}}$	−3
3313.001	2	*MB*	30175.429			3323.023	2	*MB*	30084.425	$11949°_{3\frac{1}{2}}-42033_{2\frac{1}{2}}$	−40
3313.101	2	*MB*	30174.518			3323.153	10	*WA*	30083.248	$7259°_{3\frac{1}{2}}-37342_{2\frac{1}{2}}$	−3
3313.297	60	*MB*	30172.733	$5964°_{3\frac{1}{2}}-36137_{2\frac{1}{2}}$	26	3323.290	25	*MB*	30082.008	$2634°_{2\frac{1}{2}}-32716_{2\frac{1}{2}}$	27
3313.400	5	*MB*	30171.795	$8280°_{2\frac{1}{2}}-38452_{1\frac{1}{2}}$	−8	3323.441	5	*MB*	30080.641		
3313.529	25	*MB*	30170.621	$7061°_{0\frac{1}{2}}-37232_{1\frac{1}{2}}$	21	3323.465	18	*MB*	30080.424		
3313.684	10	*MB*	30169.210	$5942°_{3\frac{1}{2}}-36112_{3\frac{1}{2}}$	−12	3323.616	1	*WA*	30079.058	$5118°_{2\frac{1}{2}}-35197_{1\frac{1}{2}}$	24
3313.793	15	*MB*	30168.217			3323.695	2	*MB*	30078.343		
3314.025	90	*MB*	30166.105	$17300°_{3\frac{1}{2}}-47466_{2\frac{1}{2}}$	−29	3323.976	10	*MB*	30075.800	$4737°_{2\frac{1}{2}}-34813_{2\frac{1}{2}}$	−28
				$0°_{3\frac{1}{2}}-30166_{3\frac{1}{2}}$	49	3324.766	40	*MB*	30068.654	$15529_{2\frac{1}{2}}-45598°_{3\frac{1}{2}}$	−70
3314.712	220	*MB*	30159.853	$3995°_{3\frac{1}{2}}-34155_{3\frac{1}{2}}$	3	3324.985	25	*MT*	30066.674	$4266°_{3\frac{1}{2}}-34333_{2\frac{1}{2}}$	−26
3314.731	40	*MB*	30159.681	$4266°_{3\frac{1}{2}}-34426_{2\frac{1}{2}}$	41	3325.055	40b	*MB*	30066.041	$3593°_{4\frac{1}{2}}-33659_{5\frac{1}{2}}$	−44
3314.947	12	*WA*	30157.716	$1410°_{4\frac{1}{2}}-31568_{4\frac{1}{2}}$	1	3325.151	35	*MB*	30065.173	$0°_{3\frac{1}{2}}-30065_{3\frac{1}{2}}$	9
3315.110	40	*MB*	30156.233	$5651°_{5\frac{1}{2}}-35807_{4\frac{1}{2}}$	22	3325.331	160	*MB*	30063.545	$8131_{4\frac{1}{2}}-38194°_{4\frac{1}{2}}$	34
3315.154	5	*MB*	30155.833	$13012°_{2\frac{1}{2}}-43167_{1\frac{1}{2}}$	48	3325.403	25	*MB*	30062.894	$3745°_{1\frac{1}{2}}-33808_{2\frac{1}{2}}$	53
3315.539	2	*MB*	30152.331			3326.075	60	*MB*	30056.820	$10454°_{1\frac{1}{2}}-40511_{1\frac{1}{2}}$	−34
3315.971	1	*WA*	30148.403	$1410°_{4\frac{1}{2}}-31558_{3\frac{1}{2}}$	81	3326.940	30	*MB*	30049.006	$3995°_{3\frac{1}{2}}-34044_{4\frac{1}{2}}$	25
3316.111	5	*MB*	30147.130	$5964°_{3\frac{1}{2}}-36112_{3\frac{1}{2}}$	5	3327.222	50	*MB*	30046.460	$3363°_{2\frac{1}{2}}-33409_{3\frac{1}{2}}$	−9
3316.344	7	*MB*	30145.012			3327.627	30	*MB*	30042.803	$16545_{5\frac{1}{2}}-46588°_{5\frac{1}{2}}$	−58
3316.704	2	*MB*	30141.740			3327.656	40	*MB*	30042.541	$2595°_{1\frac{1}{2}}-32638_{1\frac{1}{2}}$	20
3316.983	10	*MB*	30139.205	$8402°_{3\frac{1}{2}}-38541_{4\frac{1}{2}}$	0	3327.901	60	*MB*	30040.329	$5675°_{4\frac{1}{2}}-35716_{5\frac{1}{2}}$	9
3317.221	5	*MB*	30137.043	$7059°_{4\frac{1}{2}}-37196_{4\frac{1}{2}}$	−23	3328.099	2	*MB*	30038.542		
3317.263	2	*MB*	30136.661	$19481_{4\frac{1}{2}}-49617°_{5\frac{1}{2}}$	1	3328.543	20	*MB*	30034.535		
3317.351	5	*MB*	30135.862			3328.598	25	*MB*	30034.039		
3317.761	25	*MB*	30132.138			3328.757	7	*MB*	30032.605		
3317.791	180	*MB*	30131.865	$5675°_{4\frac{1}{2}}-35807_{4\frac{1}{2}}$	61	3328.926	35	*MB*	30031.080	$2382°_{4\frac{1}{2}}-32413_{3\frac{1}{2}}$	−19
3317.861	10	*MB*	30131.230	$4201°_{1\frac{1}{2}}-34333_{2\frac{1}{2}}$	25	3329.000	130	*MB*	30030.412	$7818°_{1\frac{1}{2}}-37848_{2\frac{1}{2}}$	10
3317.901	15	*WA*	30130.866	$3745°_{1\frac{1}{2}}-33876_{1\frac{1}{2}}$	−35	3329.047	35	*MB*	30029.988	$7202°_{2\frac{1}{2}}-37232_{1\frac{1}{2}}$	80
3317.962	2	*MB*	30130.312	$8702°_{1\frac{1}{2}}-38832_{2\frac{1}{2}}$	48	3329.148	25	*MB*	30029.077	$4266°_{3\frac{1}{2}}-34295_{4\frac{1}{2}}$	24
3318.396	18	*MB*	30126.372	$8402°_{3\frac{1}{2}}-38529_{2\frac{1}{2}}$	19	3329.519	10	*MB*	30025.731		
3318.527	2	*MB*	30125.183			3330.378	40	*MB*	30017.987	$4910°_{5\frac{1}{2}}-34928_{4\frac{1}{2}}$	−18
3318.950	70	*MB*	30121.343	$14827_{3\frac{1}{2}}-44949°_{4\frac{1}{2}}$	−44	3330.485	70	*WA*	30017.023	$7061°_{0\frac{1}{2}}-37078_{1\frac{1}{2}}$	−17
3318.977	50	*MB*	30121.098	$2595°_{1\frac{1}{2}}-32716_{2\frac{1}{2}}$	96	3331.010	10	*MB*	30012.292		
3319.610	2	*MB*	30115.355			3331.224	40	*MB*	30010.364	$4322°_{2\frac{1}{2}}-34333_{2\frac{1}{2}}$	−25
3319.740	2	*MB*	30114.176			3331.789	40	*MB*	30005.275	$8804°_{4\frac{1}{2}}-38809_{3\frac{1}{2}}$	23

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3332.464	20	*MB*	29999.198	$6517°_{2\frac{1}{2}}-36516_{1\frac{1}{2}}$	19	3343.174	10	*MB*	29903.097		
3332.644	20	*MB*	29997.577			3343.557	15	*MB*	29899.672	$10820_{2\frac{1}{2}}-40720°_{1\frac{1}{2}}$	36
3332.732	12	*MB*	29996.785			3343.853	300	*MB*	29897.025	$5819°_{4\frac{1}{2}}-35716_{5\frac{1}{2}}$	55
3332.877	35	*MB*	29995.480	$6521°_{1\frac{1}{2}}-36516_{1\frac{1}{2}}$	15	3344.070	15	*MB*	29895.085		
3333.037	90	*WA*	29994.041	$0°_{3\frac{1}{2}}-29994_{2\frac{1}{2}}$	0	3344.321	40	*WA*	29892.842	$11165_{8\frac{1}{2}}-41058°_{7\frac{1}{2}}$	24
3333.229	15	*MB*	29992.313	$12466°_{1\frac{1}{2}}-42458_{1\frac{1}{2}}$	0	3344.760	400	*AK*	29888.918	$4266°_{3\frac{1}{2}}-34155_{3\frac{1}{2}}$	4
3333.300	75	*MB*	29991.674			3344.848	10	*MB*	29888.132		
3333.630	20	*MB*	29988.705			3345.064	2	*MB*	29886.202		
3333.660	90	*WA*	29988.435	$5819°_{4\frac{1}{2}}-35807_{4\frac{1}{2}}$	−19	3345.814	10	*MB*	29879.503		
3333.895	60	*MB*	29986.322	$7818°_{1\frac{1}{2}}-37804_{1\frac{1}{2}}$	35	3345.951	15	*MB*	29878.280		
3334.272	50	*MB*	29982.931	$5942°_{3\frac{1}{2}}-35925_{3\frac{1}{2}}$	47	3346.019	2	*MB*	29877.672	$18147°_{2\frac{1}{2}}-48024_{2\frac{1}{2}}$	2
3334.422	25	*MB*	29981.582	$3995°_{3\frac{1}{2}}-33977_{3\frac{1}{2}}$	−97	3346.162	30	*MB*	29876.396	$7202°_{2\frac{1}{2}}-37078_{1\frac{1}{2}}$	46
3334.451	180	*MB*	29981.322	$10058_{6\frac{1}{2}}-40039°_{6\frac{1}{2}}$	24	3346.400	20	*MB*	29874.271		
3334.876	30	*MB*	29977.501	$1873°_{3\frac{1}{2}}-31851_{2\frac{1}{2}}$	38	3346.512	90	*MB*	29873.271	$4459°_{3\frac{1}{2}}-34333_{2\frac{1}{2}}$	45
3334.975	2	*MB*	29976.611	$12057°_{2\frac{1}{2}}-42033_{2\frac{1}{2}}$	63	3346.613	10	*MB*	29872.369		
3335.682	40	*MB*	29970.258	$7878°_{3\frac{1}{2}}-37848_{2\frac{1}{2}}$	36	3346.916	10	*WA*	29869.665	$10641°_{2\frac{1}{2}}-40511_{1\frac{1}{2}}$	−19
3335.867	15	*MB*	29968.596	$4844°_{1\frac{1}{2}}-34813_{2\frac{1}{2}}$	38	3347.225	2	*MB*	29866.908		
3336.054	20	*MB*	29966.916	$6549°_{2\frac{1}{2}}-36516_{1\frac{1}{2}}$	26	3347.466	40	*MB*	29864.758	$5942°_{3\frac{1}{2}}-35807_{4\frac{1}{2}}$	−11
3336.136	20	*MB*	29966.179	$4459°_{3\frac{1}{2}}-34426_{2\frac{1}{2}}$	15					$7059°_{4\frac{1}{2}}-36923_{4\frac{1}{2}}$	41
3336.178	15	*MB*	29965.802			3348.190	8	*MT*	29858.300	$13784°_{1\frac{1}{2}}-43643_{0\frac{1}{2}}$	−95
3336.361	50	*MB*	29964.159	$4201°_{1\frac{1}{2}}-34166_{1\frac{1}{2}}$	13	3348.261	2	*MB*	29857.667	$11340°_{3\frac{1}{2}}-41198_{2\frac{1}{2}}$	−43
3336.543	40	*MB*	29962.524	$7233°_{5\frac{1}{2}}-37196_{4\frac{1}{2}}$	12	3348.696	2	*MB*	29853.789		
3336.744	30	*WA*	29960.719	$5964°_{3\frac{1}{2}}-35925_{3\frac{1}{2}}$	−66	3349.131	2	*MB*	29849.911		
3337.550	10	*MB*	29953.484	$19136°_{2\frac{1}{2}}-49089_{2\frac{1}{2}}$	22	3349.190	2	*MB*	29849.385		
				$7278°_{1\frac{1}{2}}-37232_{1\frac{1}{2}}$	−31	3349.512	12	*MB*	29846.516		
3337.839	20	*MB*	29950.891	$19138°_{1\frac{1}{2}}-49089_{2\frac{1}{2}}$	−60	3349.873	20	*MB*	29843.299	$4322°_{2\frac{1}{2}}-34166_{1\frac{1}{2}}$	−31
3337.950	10	*MB*	29949.895			3349.958	90	*MB*	29842.542	$5716°_{3\frac{1}{2}}-35558_{3\frac{1}{2}}$	56
3338.416	5	*MB*	29945.714			3349.987	40	*WA*	29842.284	$7746°_{2\frac{1}{2}}-37588_{3\frac{1}{2}}$	−3
3338.467	12	*MB*	29945.257			3350.070	12	*MB*	29841.544	$987°_{4\frac{1}{2}}-30829_{3\frac{1}{2}}$	32
3338.527	10	*MB*	29944.719	$13515°_{3\frac{1}{2}}-43460_{2\frac{1}{2}}$	39	3350.166	2	*MB*	29840.690		
3338.647	7	*MB*	29943.642			3350.403	7	*MB*	29838.579	$5969°_{5\frac{1}{2}}-35807_{4\frac{1}{2}}$	18
3338.744	7	*MB*	29942.773			3350.676	25	*MB*	29836.148	$10035°_{5\frac{1}{2}}-39871_{4\frac{1}{2}}$	26
3338.894	5	*MB*	29941.427			3350.737	35	*MB*	29835.604	$4459°_{3\frac{1}{2}}-34295_{4\frac{1}{2}}$	27
3339.071	5	*MB*	29939.840			3350.835	20	*MB*	29834.732	$7059°_{4\frac{1}{2}}-36893_{3\frac{1}{2}}$	34
3339.344	10	*MB*	29937.393	$18393_{3\frac{1}{2}}-48330°_{3\frac{1}{2}}$	−69	3350.921	40	*MB*	29833.966	$7818°_{1\frac{1}{2}}-37652_{2\frac{1}{2}}$	23
3339.505	90	*MB*	29935.949	$2382°_{4\frac{1}{2}}-32318_{3\frac{1}{2}}$	21	3351.070	40	*MB*	29832.640	$4322°_{2\frac{1}{2}}-34155_{3\frac{1}{2}}$	37
3339.794	60	*MB*	29933.359	$10924°_{4\frac{1}{2}}-40858_{4\frac{1}{2}}$	30	3351.132	20	*WA*	29832.088	$2581°_{4\frac{1}{2}}-32413_{3\frac{1}{2}}$	0
3340.244	2	*MB*	29929.327			3351.513	45	*MB*	29828.697	$3745°_{1\frac{1}{2}}-33574_{1\frac{1}{2}}$	27
3340.301	30	*MB*	29928.816	$2563°_{5\frac{1}{2}}-32492_{5\frac{1}{2}}$	11	3351.746	25	*MB*	29826.623	$8702°_{1\frac{1}{2}}-38529_{2\frac{1}{2}}$	46
3340.881	70	*MB*	29923.620	$5010°_{2\frac{1}{2}}-34934_{2\frac{1}{2}}$	67	3352.275	90b	*MB*	29821.917	$4511°_{2\frac{1}{2}}-34333_{2\frac{1}{2}}$	78
						3352.347	15	*MB*	29821.276		
3341.005	35	*MB*	29922.510	$2879°_{5\frac{1}{2}}-32802_{5\frac{1}{2}}$	40	3352.938	90	*MB*	29816.020	$3593°_{4\frac{1}{2}}-33409_{3\frac{1}{2}}$	5
3341.262	5	*MB*	29920.208			3352.979	60	*MB*	29815.655	$5118°_{2\frac{1}{2}}-34934_{2\frac{1}{2}}$	38
3341.604	7	*MB*	29917.146			3353.058	10	*MB*	29814.953	$15134_{4\frac{1}{2}}-44949°_{4\frac{1}{2}}$	−7
3341.655	15	*MB*	29916.690	$8278_{5\frac{1}{2}}-38194°_{4\frac{1}{2}}$	16	3353.207	15	*MB*	29813.628		
3341.863	220	*MB*	29914.827	$4511°_{2\frac{1}{2}}-34426_{2\frac{1}{2}}$	48						
						3353.318	70	*MB*	29812.641	$6389°_{4\frac{1}{2}}-36202_{4\frac{1}{2}}$	26
3342.197	30	*MB*	29911.838	$2595°_{1\frac{1}{2}}-32507_{1\frac{1}{2}}$	40	3353.553	20	*MB*	29810.552	$12762°_{4\frac{1}{2}}-42573_{3\frac{1}{2}}$	2
3342.312	20	*WA*	29910.809	$2581°_{4\frac{1}{2}}-32492_{5\frac{1}{2}}$	28					$11387°_{3\frac{1}{2}}-41198_{2\frac{1}{2}}$	−25
3342.525	35	*MB*	29908.903	$0°_{3\frac{1}{2}}-29908_{4\frac{1}{2}}$	0	3353.824	25	*MB*	29808.143		
3342.854	10	*MB*	29905.959	$7746°_{2\frac{1}{2}}-37652_{2\frac{1}{2}}$	54	3353.942	60	*MB*	29807.095	$3745°_{1\frac{1}{2}}-33552_{2\frac{1}{2}}$	−11
3342.996	7	*MB*	29904.689							$0°_{3\frac{1}{2}}-29807_{3\frac{1}{2}}$	17

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3354.430	25	*MB*	29802.759		
3354.487	10	*MB*	29802.252	$5010°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−79
3354.516	45	*MB*	29801.995	$5118°_{2\frac{1}{2}} - 34920_{3\frac{1}{2}}$	13
3354.982	25	*MB*	29797.855	$8175°_{2\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−57
3355.012	180	*MB*	29797.589	$7818°_{1\frac{1}{2}} - 37615_{0\frac{1}{2}}$	2
				$1410°_{4\frac{1}{2}} - 31207_{3\frac{1}{2}}$	−33
3355.223	20	*MB*	29795.715		
3355.359	10	*MB*	29794.507	$0°_{3\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−9
3355.415	7	*MB*	29794.010		
3356.071	25	*MB*	29788.186	$5437°_{3\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−47
3356.390	50	*MB*	29785.355		
3356.410	100	*MB*	29785.178	$3363°_{2\frac{1}{2}} - 33148_{2\frac{1}{2}}$	16
3356.759	40	*MB*	29782.081	$9053_{3\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	−23
3357.215	220	*MT*	29778.036	$4266°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−7
3357.421	35	*MB*	29776.209	$15822_{3\frac{1}{2}} - 45598°_{3\frac{1}{2}}$	−32
3357.722	30	*MB*	29773.540	$12260°_{3\frac{1}{2}} - 42033_{2\frac{1}{2}}$	−26
3357.849	25	*MB*	29772.414	$4523°_{4\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−2
3357.920	20	*WA*	29771.784	$2641°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−2
3358.083	10	*MB*	29770.339		
3358.423	35	*MB*	29767.326	$6521°_{1\frac{1}{2}} - 36288_{0\frac{1}{2}}$	0
3358.490	40	*MB*	29766.732	$10088°_{1\frac{1}{2}} - 39855_{0\frac{1}{2}}$	−26
3358.630	2	*MB*	29765.491	$14315°_{0\frac{1}{2}} - 44081_{1\frac{1}{2}}$	48
3358.692	5	*MB*	29764.941		
3360.346	20	*MB*	29750.291	$8702°_{1\frac{1}{2}} - 38452_{1\frac{1}{2}}$	−14
3360.401	25	*MB*	29749.805	$10088°_{1\frac{1}{2}} - 39838_{2\frac{1}{2}}$	0
3360.538	180	*MB*	29748.592	$11309_{7\frac{1}{2}} - 41058°_{7\frac{1}{2}}$	−49
3360.708	30	*MB*	29747.087	$5969°_{5\frac{1}{2}} - 35716_{5\frac{1}{2}}$	11
3360.783	2	*MB*	29746.423		
3360.990	20	*MB*	29744.591	$11340°_{3\frac{1}{2}} - 41085_{3\frac{1}{2}}$	−24
3361.217	12	*MB*	29742.582	$4165_{4\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	−60
3361.555	50	*MB*	29739.592	$5819°_{4\frac{1}{2}} - 35558_{3\frac{1}{2}}$	3
3361.744	40	*MB*	29737.920		
3361.767	100	*MB*	29737.717	$3793°_{6\frac{1}{2}} - 33531_{6\frac{1}{2}}$	−36
3361.858	45	*MB*	29736.912	$2581°_{4\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−5
3362.067	7	*MB*	29735.063		
3362.347	12	*MB*	29732.587		
3363.027	2	*MB*	29726.575		
3363.371	30	*MB*	29723.535	$10114°_{2\frac{1}{2}} - 39838_{2\frac{1}{2}}$	−26
3363.535	35	*MB*	29722.086	$6389°_{4\frac{1}{2}} - 36112_{3\frac{1}{2}}$	7
3363.899	2	*WA*	29718.870	$2595°_{1\frac{1}{2}} - 32314_{0\frac{1}{2}}$	45
3364.336	90	*MB*	29715.010	$987°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	11
3364.621	50	*WA*	29712.493	$7818°_{1\frac{1}{2}} - 37530_{1\frac{1}{2}}$	7
3364.818	50	*PK*	29710.753	$4266°_{3\frac{1}{2}} - 33977_{3\frac{1}{2}}$	10
3364.892	20	*MB*	29710.100	$7878°_{3\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−44
3365.137	20	*MB*	29707.937		
3365.322	50	*MB*	29706.304	$3703°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	1
3365.518	2	*MB*	29704.574		
3365.706	35	*MB*	29702.914	$3593°_{4\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−8
3365.823	50	*MB*	29701.882	$13758°_{1\frac{1}{2}} - 43460_{2\frac{1}{2}}$	19
3366.552	220b	*AK*	29695.451	$4459°_{3\frac{1}{2}} - 34155_{3\frac{1}{2}}$	12
3366.673	25	*MB*	29694.383	$5118°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−12
3367.022	5	*MB*	29691.306	$7202°_{2\frac{1}{2}} - 36893_{3\frac{1}{2}}$	65
3367.082	12	*MB*	29690.777		
3367.152	25	*MB*	29690.159	$7233°_{5\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−2
3367.275	45	*MB*	29689.075		
3367.316	30	*WA*	29688.713	$4737°_{2\frac{1}{2}} - 34426_{2\frac{1}{2}}$	50
3367.525	25	*MB*	29686.871	$3363°_{2\frac{1}{2}} - 33050_{1\frac{1}{2}}$	7
3367.742	12	*MB*	29684.958	$13027_{6\frac{1}{2}} - 42712°_{6\frac{1}{2}}$	−93
3367.774	35	*MB*	29684.676	$1873°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−15
3367.873	15	*MB*	29683.803	$14739_{2\frac{1}{2}} - 44423°_{1\frac{1}{2}}$	−10
3367.906	5	*MB*	29683.513	$2634°_{2\frac{1}{2}} - 32318_{3\frac{1}{2}}$	4
3368.117	30	*MB*	29681.653	$3854_{3\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	29
				$3363°_{2\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−14
3368.346	10	*MB*	29679.635		
3368.368	40	*PK*	29679.441	$1410°_{4\frac{1}{2}} - 31089_{5\frac{1}{2}}$	15
3368.606	12	*MB*	29677.344		
3368.689	50	*MB*	29676.613	$2641°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−2
3368.790	40b	*MB*	29675.724	$13784°_{1\frac{1}{2}} - 43460_{2\frac{1}{2}}$	25
3368.930	25	*MB*	29674.490	$4201°_{1\frac{1}{2}} - 33876_{1\frac{1}{2}}$	6
3369.041	45	*MB*	29673.513	$7522°_{5\frac{1}{2}} - 37196_{4\frac{1}{2}}$	−4
3369.221	5	*MB*	29671.927		
3369.382	50	*MB*	29670.510	$5675°_{4\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−8
3369.582	12	*MB*	29668.749	$3508°_{0\frac{1}{2}} - 33177_{0\frac{1}{2}}$	23
3369.672	2	*MT*	29667.956	$9269°_{0\frac{1}{2}} - 38937_{1\frac{1}{2}}$	−33
3369.744	30	*MB*	29667.322	$19950_{6\frac{1}{2}} - 49617°_{5\frac{1}{2}}$	−37
3369.976	25	*MB*	29665.280	$1410°_{4\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−18
3370.040	60	*MB*	29664.717	$7259°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	3
3370.558	2	*MB*	29660.158		
3370.699	7	*MB*	29658.917		
3371.169	180	*MB*	29654.782	$4511°_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	1
3371.206	15	*MB*	29654.457	$4322°_{2\frac{1}{2}} - 33977_{3\frac{1}{2}}$	25
3371.839	40	*MB*	29648.890	$5118°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	5
3372.388	20	*MB*	29644.064	$4511°_{2\frac{1}{2}} - 34155_{3\frac{1}{2}}$	10
3372.647	20	*MB*	29641.787	$7202°_{2\frac{1}{2}} - 36844_{2\frac{1}{2}}$	11
3372.792	20	*MB*	29640.513		
3372.903	2	*MB*	29639.537		
3373.020	2	*MB*	29638.509		
3373.246	2	*MB*	29636.524		
3373.362	20	*MB*	29635.505	$19982_{4\frac{1}{2}} - 49617°_{5\frac{1}{2}}$	−7
3373.450	180	*MB*	29634.731	$8169°_{1\frac{1}{2}} - 37804_{1\frac{1}{2}}$	−4
				$2563°_{5\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−17
3373.727	180	*MB*	29632.298	$4523°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	21
3373.849	10	*MB*	29631.227		
3373.978	40	*MB*	29630.094	$5716°_{3\frac{1}{2}} - 35346_{3\frac{1}{2}}$	28
3374.151	50	*MB*	29628.575	$8175°_{2\frac{1}{2}} - 37804_{1\frac{1}{2}}$	4
3374.608	30	*MB*	29624.563		
3374.819	30	*MB*	29622.711	$9269°_{0\frac{1}{2}} - 38892_{0\frac{1}{2}}$	36
3375.127	45	*MB*	29620.007	$6517°_{2\frac{1}{2}} - 36137_{2\frac{1}{2}}$	23
3375.240	25	*MB*	29619.016		

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3375.303	25	*MB*	29618.463								
3375.502	35	*MB*	29616.717	$2581°_{4\frac{1}{2}}-32197_{4\frac{1}{2}}$	−7	3384.122	10	*MB*	29541.280		
3375.556	30	*MB*	29616.243	$6521°_{1\frac{1}{2}}-36137_{2\frac{1}{2}}$	−28	3384.632	12	*MB*	29536.829		
3375.592	30	*MB*	29615.927	$5942°_{3\frac{1}{2}}-35558_{3\frac{1}{2}}$	23	3384.756	30	*MB*	29535.747	$6389°_{4\frac{1}{2}}-35925_{3\frac{1}{2}}$	7
3375.770	70	*MB*	29614.366	$8927°_{5\frac{1}{2}}-38541_{4\frac{1}{2}}$	7	3385.057	25	*MB*	29533.120	$5924°_{1\frac{1}{2}}-35457_{1\frac{1}{2}}$	7
3375.826	10	*MB*	29613.874			3385.153	5	*MB*	29532.283		
3376.002	20	*MB*	29612.331	$2879°_{5\frac{1}{2}}-32492_{5\frac{1}{2}}$	−11	3385.743	25	*MB*	29527.137	$5819°_{4\frac{1}{2}}-35346_{3\frac{1}{2}}$	−31
3376.137	15	*MB*	29611.146	$9198°_{3\frac{1}{2}}-38809_{3\frac{1}{2}}$	−3	3386.080	40	*MB*	29524.198	$7818°_{1\frac{1}{2}}-37342_{2\frac{1}{2}}$	18
3376.335	5	*MB*	29609.410			3386.400	15	*MB*	29521.408	$4523°_{4\frac{1}{2}}-34044_{4\frac{1}{2}}$	0
3376.465	20	*MB*	29608.270			3386.569	20	*MB*	29519.935		
3376.678	30	*MB*	29606.403	$10869_{4\frac{1}{2}}-40475°_{3\frac{1}{2}}$	19	3386.675	2	*MB*	29519.011		
				$4201°_{1\frac{1}{2}}-33808_{2\frac{1}{2}}$	−20	3386.837	25	*MB*	29517.599	$11340°_{3\frac{1}{2}}-40858_{4\frac{1}{2}}$	−7
3376.963	15	*WA*	29603.904	$11454_{6\frac{1}{2}}-41058°_{7\frac{1}{2}}$	−8	3386.873	20	*MB*	29517.286	$4459°_{3\frac{1}{2}}-33977_{3\frac{1}{2}}$	18
3377.119	440	*MB*	29602.536	$4910°_{5\frac{1}{2}}-34513_{6\frac{1}{2}}$	32	3387.029	2	*MB*	29515.926		
3377.300	30	*MB*	29600.950	$15529_{2\frac{1}{2}}-45130°_{2\frac{1}{2}}$	−2	3387.073	7	*MB*	29515.543		
3377.765	35	*MB*	29596.875	$10274°_{3\frac{1}{2}}-39871_{4\frac{1}{2}}$	13	3387.125	5	*MB*	29515.090		
3377.846	15	*MB*	29596.165	$7746°_{2\frac{1}{2}}-37342_{2\frac{1}{2}}$	24	3387.336	30	*MB*	29513.251	$5513_{5\frac{1}{2}}-35026°_{4\frac{1}{2}}$	16
3378.113	30	*MB*	29593.826	$5964°_{3\frac{1}{2}}-35558_{3\frac{1}{2}}$	21	3387.535	35	*MB*	29511.517		
3378.183	45	*MB*	29593.213	$3703°_{3\frac{1}{2}}-33296_{4\frac{1}{2}}$	2	3387.770	70	*MB*	29509.470	$5716°_{3\frac{1}{2}}-35225_{2\frac{1}{2}}$	31
3378.364	2	*MB*	29591.628			3387.964	10	*MB*	29507.781		
3378.481	2	*MB*	29590.603			3388.036	15	*MB*	29507.154		
3378.810	40	*MB*	29587.722	$6549°_{2\frac{1}{2}}-36137_{2\frac{1}{2}}$	26	3388.240	20	*MB*	29505.377		
3379.049	7	*MB*	29585.629			3388.394	30	*MB*	29504.036	$2634°_{2\frac{1}{2}}-32138_{2\frac{1}{2}}$	4
3379.167	130	*MB*	29584.596	$4459°_{3\frac{1}{2}}-34044_{4\frac{1}{2}}$	27	3388.476	30	*MB*	29503.322	$11007°_{1\frac{1}{2}}-40511_{1\frac{1}{2}}$	−5
3379.662	25	*MB*	29580.263			3388.544	15	*MB*	29502.730		
3379.763	35	*MB*	29579.379			3388.818	10	*MB*	29500.345		
3380.186	2	*MB*	29575.678	$13758°_{1\frac{1}{2}}-43334_{0\frac{1}{2}}$	14	3389.195	30	*MB*	29497.063	$5437°_{3\frac{1}{2}}-34934_{2\frac{1}{2}}$	63
3381.114	35	*MB*	29567.560	$8702°_{1\frac{1}{2}}-38269_{0\frac{1}{2}}$	31	3389.285	15	*MB*	29496.280		
				$8280°_{2\frac{1}{2}}-37848_{2\frac{1}{2}}$	−43	3389.413	30	*MB*	29495.166	$1873°_{3\frac{1}{2}}-31369_{2\frac{1}{2}}$	7
3381.244	2	*MB*	29566.424			3389.498	12	*MB*	29494.427	$19136°_{2\frac{1}{2}}-48630_{1\frac{1}{2}}$	−5
3381.484	90	*MB*	29564.325	$6638°_{4\frac{1}{2}}-36202_{4\frac{1}{2}}$	26	3389.826	45	*MB*	29491.573	$5437°_{3\frac{1}{2}}-34928_{4\frac{1}{2}}$	26
3381.582	20	*MB*	29563.468	$10274°_{3\frac{1}{2}}-39838_{2\frac{1}{2}}$	−5	3389.950	20	*MB*	29490.494		
3381.856	10	*MB*	29561.073	$13012°_{2\frac{1}{2}}-42573_{3\frac{1}{2}}$	−22	3390.061	5	*MB*	29489.529		
3381.918	20	*MB*	29560.531			3390.329	10	*MB*	29487.197		
3382.201	12	*MB*	29558.058			3390.505	90	*MB*	29485.667	$3593°_{4\frac{1}{2}}-33079_{3\frac{1}{2}}$	37
3382.307	45	*MB*	29557.132	$3995°_{3\frac{1}{2}}-33552_{2\frac{1}{2}}$	10	3390.616	15	*MB*	29484.702	$5283°_{0\frac{1}{2}}-34767_{1\frac{1}{2}}$	40
3382.387	10	*MB*	29556.432	$7522°_{0\frac{1}{2}}-37078_{1\frac{1}{2}}$	12	3390.774	10	*MB*	29483.328	$5437°_{3\frac{1}{2}}-34920_{3\frac{1}{2}}$	−37
				$2641°_{3\frac{1}{2}}-32197_{4\frac{1}{2}}$	10	3390.802	35	*MB*	29483.084	$7713°_{4\frac{1}{2}}-37196_{4\frac{1}{2}}$	35
3382.474	12	*MB*	29555.673			3390.977	20	*MB*	29481.563		
3382.504	40	*MB*	29555.410	$2382°_{4\frac{1}{2}}-31937_{3\frac{1}{2}}$	4	3391.403	15	*MB*	29477.860		
3382.600	5	*MB*	29554.572			3391.461	10	*MB*	29477.356		
3382.672	40	*MB*	29553.943	$15576_{1\frac{1}{2}}-45130°_{2\frac{1}{2}}$	−17	3391.586	35	*MB*	29476.269	$8175°_{2\frac{1}{2}}-37652_{2\frac{1}{2}}$	42
3382.701	30	*MB*	29553.689	$4322°_{2\frac{1}{2}}-33876_{1\frac{1}{2}}$	20	3391.870	20	*MB*	29473.801	$6638°_{4\frac{1}{2}}-36112_{3\frac{1}{2}}$	39
3383.190	7	*MB*	29549.418	$13784°_{1\frac{1}{2}}-43334_{0\frac{1}{2}}$	−79	3392.251	25	*MB*	29470.491	$11387°_{3\frac{1}{2}}-40858_{4\frac{1}{2}}$	17
3383.271	20	*MB*	29548.710	$2382°_{4\frac{1}{2}}-31930_{4\frac{1}{2}}$	21	3392.782	40	*WA*	29465.879	$4511°_{2\frac{1}{2}}-33977_{3\frac{1}{2}}$	−3
3383.388	50	*MB*	29547.688	$11742°_{5\frac{1}{2}}-41289_{5\frac{1}{2}}$	−37						
3383.472	15	*MB*	29546.955			3392.996	10	*MB*	29464.020	$7878°_{3\frac{1}{2}}-37342_{2\frac{1}{2}}$	22
3383.675	180	*MB*	29545.182	$4266°_{3\frac{1}{2}}-33811_{4\frac{1}{2}}$	12	3393.287	15	*MB*	29461.494		
3383.919	60	*MB*	29543.052	$2595°_{1\frac{1}{2}}-32138_{2\frac{1}{2}}$	−1	3393.333	12	*MB*	29461.094		
3384.055	35	*MB*	29541.865	$3508°_{0\frac{1}{2}}-33050_{1\frac{1}{2}}$	44	3393.713	2	*MB*	29457.796		
				$4266°_{3\frac{1}{2}}-33808_{2\frac{1}{2}}$	−54	3393.913	90	*MB*	29456.060	$4203°_{6\frac{1}{2}}-33659_{5\frac{1}{2}}$	26

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3394.134	60	*MB*	29454.142	$4523°_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	35	3403.722	25	*MB*	29371.175	$8280°_{2\frac{1}{2}} - 37652_{2\frac{1}{2}}$	30
3394.332	10	*MB*	29452.424			3403.844	30	*MB*	29370.122	$4165_{4\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	36
3394.370	15	*MB*	29452.094			3404.122	35	*MB*	29367.723	$2563°_{5\frac{1}{2}} - 31930_{4\frac{1}{2}}$	21
3394.794	15	*MB*	29448.416			3404.226	2	*MB*	29366.826		
3394.997	30	*MB*	29446.655	$13012°_{2\frac{1}{2}} - 42458_{1\frac{1}{2}}$	7	3404.421	35	*MB*	29365.144	$4511°_{2\frac{1}{2}} - 33876_{1\frac{1}{2}}$	24
3395.033	50	*MB*	29446.343	$9491°_{0\frac{1}{2}} - 38937_{1\frac{1}{2}}$	20	3404.465	20	*MB*	29364.765	$0°_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	25
3395.187	5	*MB*	29445.007	$3703°_{3\frac{1}{2}} - 33148_{2\frac{1}{2}}$	12	3404.904	180	*MB*	29360.979	$1873°_{3\frac{1}{2}} - 31234_{2\frac{1}{2}}$	34
3396.038	15	*MB*	29437.629			3405.307	5	*MB*	29357.504		
3396.169	7	*MB*	29436.493			3405.444	20	*WA*	29356.323	$2581°_{4\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−72
3396.226	2	*MB*	29435.999			3405.623	20	*MB*	29354.780	$8175°_{2\frac{1}{2}} - 37530_{1\frac{1}{2}}$	10
3396.714	35	*MB*	29431.770	$3745°_{1\frac{1}{2}} - 33177_{0\frac{1}{2}}$	50	3405.803	40	*MB*	29353.229	$3363°_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	9
3396.940	10	*MB*	29429.812			3405.970	220	*MB*	29351.790	$4459°_{3\frac{1}{2}} - 33811_{4\frac{1}{2}}$	95
3397.071	40	*MB*	29428.678	$4737°_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	12					$3508°_{0\frac{1}{2}} - 32860_{0\frac{1}{2}}$	−92
3397.149	5	*MB*	29428.002			3406.093	40	*MB*	29350.730	$4201°_{1\frac{1}{2}} - 33552_{2\frac{1}{2}}$	41
3397.204	20	*MB*	29427.525			3406.213	50	*MB*	29349.696	$2581°_{4\frac{1}{2}} - 31930_{4\frac{1}{2}}$	17
3397.457	20	*MB*	29425.334			3406.356	45	*MB*	29348.464	$4459°_{3\frac{1}{2}} - 33808_{2\frac{1}{2}}$	19
3397.599	2	*MB*	29424.104			3406.426	20	*MB*	29347.861	$5513_{5\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	44
3397.622	7	*MB*	29423.905			3406.605	2	*MB*	29346.319		
3397.767	7	*MB*	29422.650			3406.933	10	*MB*	29343.493	$9198°_{3\frac{1}{2}} - 38541_{4\frac{1}{2}}$	−53
3397.802	2	*MB*	29422.347			3407.239	40	*MB*	29340.858	$18704_{5\frac{1}{2}} - 48045°_{6\frac{1}{2}}$	71
3398.120	5	*MB*	29419.593			3407.397	20	*MB*	29339.498		
3398.209	20	*MB*	29418.823	$1410°_{4\frac{1}{2}} - 30829_{3\frac{1}{2}}$	3	3407.580	50	*MB*	29337.922		
3398.311	25	*MB*	29417.940	$4737°_{2\frac{1}{2}} - 34155_{3\frac{1}{2}}$	2	3408.036	15	*MB*	29333.997	$1873°_{3\frac{1}{2}} - 31207_{3\frac{1}{2}}$	4
3398.570	12	*MB*	29415.698	$15235_{1\frac{1}{2}} - 44651°_{1\frac{1}{2}}$	−25	3408.188	2	*WA*	29332.689	$7746°_{2\frac{1}{2}} - 37078_{1\frac{1}{2}}$	−4
3398.627	20	*MB*	29415.205	$5010°_{2\frac{1}{2}} - 34426_{2\frac{1}{2}}$	38	3408.415	10	*MB*	29330.735	$9198°_{3\frac{1}{2}} - 38529_{2\frac{1}{2}}$	40
3398.715	45	*MB*	29414.443	$3995°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	6	3408.615	10	*MB*	29329.014		
3398.926	25	*MB*	29412.617	$8175°_{2\frac{1}{2}} - 37588_{3\frac{1}{2}}$	7	3408.796	50	*WA*	29327.457	$4203°_{6\frac{1}{2}} - 33531_{6\frac{1}{2}}$	3
3399.149	2	*MB*	29410.687			3408.949	25	*MB*	29326.141	$6389°_{4\frac{1}{2}} - 35716_{5\frac{1}{2}}$	0
3399.328	10	*MB*	29409.139	$13758°_{1\frac{1}{2}} - 43167_{1\frac{1}{2}}$	−70	3409.399	30	*MB*	29322.270	$5010°_{2\frac{1}{2}} - 34333_{2\frac{1}{2}}$	42
3399.471	20	*MB*	29407.902			3409.500	25	*MB*	29321.402	$4844°_{1\frac{1}{2}} - 34166_{1\frac{1}{2}}$	7
3399.781	5	*MB*	29405.220			3409.780	5	*MB*	29318.994		
3399.983	12	*MB*	29403.473	$5942°_{3\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−10	3409.862	15	*MB*	29318.289	$2879°_{5\frac{1}{2}} - 32197_{4\frac{1}{2}}$	2
3400.082	2	*MB*	29402.617			3410.215	50	*MB*	29315.254	$4844°_{1\frac{1}{2}} - 34159_{0\frac{1}{2}}$	21
3400.246	40	*MB*	29401.199	$7522°_{5\frac{1}{2}} - 36923_{4\frac{1}{2}}$	32	3410.328	15	*WA*	29314.283	$7202°_{2\frac{1}{2}} - 36516_{1\frac{1}{2}}$	14
3400.340	20	*MB*	29400.387			3411.007	15	*MB*	29308.447	$15822_{3\frac{1}{2}} - 45130°_{2\frac{1}{2}}$	−22
3400.736	5	*MB*	29396.963			3411.112	15	*MB*	29307.546	$8280°_{2\frac{1}{2}} - 37588_{3\frac{1}{2}}$	19
3400.961	5	*MB*	29395.018			3411.427	30	*MB*	29304.839	$3745°_{1\frac{1}{2}} - 33050_{1\frac{1}{2}}$	24
3401.139	2	*MB*	29393.480	$10646_{5\frac{1}{2}} - 40039°_{6\frac{1}{2}}$	26	3411.567	30	*MB*	29303.637	$9634°_{1\frac{1}{2}} - 38937_{1\frac{1}{2}}$	7
3401.442	2	*MB*	29390.862			3411.623	15	*MB*	29303.156		
3401.995	20	*MB*	29386.084			3411.834	40	*WA*	29301.344	$3995°_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	0
3402.179	30	*MB*	29384.495	$4910°_{5\frac{1}{2}} - 34295_{4\frac{1}{2}}$	8	3412.032	25	*MB*	29299.643	$3745°_{1\frac{1}{2}} - 33045_{2\frac{1}{2}}$	24
3402.253	10	*MB*	29383.856			3412.097	15	*MB*	29299.085		
3402.273	7	*MB*	29383.683			3412.226	30	*MB*	29297.978	$8896_{5\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	−20
3402.405	7	*MB*	29382.543			3412.331	40	*MB*	29297.076	$4511°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	16
3402.542	4	*WA*	29381.360	$5964°_{3\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−25	3412.444	2	*MB*	29296.106	$2641°_{3\frac{1}{2}} - 31937_{3\frac{1}{2}}$	12
3402.723	12	*MB*	29379.797			3412.738	30	*MB*	29293.582		
3402.929	12	*MB*	29378.019			3412.855	12	*MB*	29292.578		
3403.177	25	*MB*	29375.878	$3703°_{3\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−39	3412.888	5	*MB*	29292.295	$1410°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	−10
3403.436	12	*MB*	29373.643			3413.231	20	*WA*	29289.351	$2641°_{3\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−25
3403.593	70	*MB*	29372.288	$4201°_{1\frac{1}{2}} - 33574_{1\frac{1}{2}}$	36	3413.325	40	*MB*	29288.545	$4523°_{4\frac{1}{2}} - 33811_{4\frac{1}{2}}$	11

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3413.454	15	*PK*	29287.438	$6638°_{4\frac{1}{2}} - 35925_{3\frac{1}{2}}$	14	3422.869	12	*MB*	29206.882	$8927°_{5\frac{1}{2}} - 38134_{4\frac{1}{2}}$	−3
3413.602	20	*MB*	29286.168	$4266°_{3\frac{1}{2}} - 33552_{2\frac{1}{2}}$	−16	3423.244	10	*MB*	29203.682		
3413.649	25	*MB*	29285.765	$19982_{4\frac{1}{2}} - 49267°_{4\frac{1}{2}}$	−29	3423.416	10	*MB*	29202.215	$13527_{4\frac{1}{2}} - 42729°_{5\frac{1}{2}}$	7
3414.160	35	*MB*	29281.382	$0°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	8	3423.483	20	*MB*	29201.644	$1873°_{3\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−24
3414.307	40	*MB*	29280.121	$10114°_{2\frac{1}{2}} - 39394_{3\frac{1}{2}}$	11	3423.624	25	*MB*	29200.441		
3414.484	20	*MB*	29278.603			3423.846	100	*WA*	29198.548	$9634°_{1\frac{1}{2}} - 38832_{2\frac{1}{2}}$	25
3414.602	25	*MB*	29277.592	$5651°_{5\frac{1}{2}} - 34928_{4\frac{1}{2}}$	−19	3423.912	30	*MB*	29197.985		
3414.638	20	*MB*	29277.283			3424.020	40	*WA*	29197.064	$10641°_{2\frac{1}{2}} - 39838_{2\frac{1}{2}}$	61
3414.699	10	*MB*	29276.760	$13256_{1\frac{1}{2}} - 42533°_{1\frac{1}{2}}$	2	3424.289	20	*MB*	29194.771		
3414.780	20	*MB*	29276.066			3425.342	70	*MB*	29185.796	$8402°_{3\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−8
3414.946	1	*WA*	29274.642	$3363°_{2\frac{1}{2}} - 32638_{1\frac{1}{2}}$	−95					$2382°_{4\frac{1}{2}} - 31568_{4\frac{1}{2}}$	23
3415.064	35	*MB*	29273.631	$5924°_{1\frac{1}{2}} - 35197_{1\frac{1}{2}}$	−4	3425.398	35	*MB*	29185.319	$11325°_{2\frac{1}{2}} - 40511_{1\frac{1}{2}}$	−26
3415.616	40	*MB*	29268.900	$3593°_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	16	3425.501	5	*MB*	29184.441		
3415.943	12	*MB*	29266.098			3425.679	20	*WA*	29182.925	$9269°_{0\frac{1}{2}} - 38452_{1\frac{1}{2}}$	1
3416.169	10	*MB*	29264.162			3425.937	60	*WA*	29180.727	$7713°_{4\frac{1}{2}} - 36893_{3\frac{1}{2}}$	47
3416.344	2	*MB*	29262.663			3426.203	360	*MB*	29178.462	$987°_{4\frac{1}{2}} - 30166_{3\frac{1}{2}}$	16
3416.450	35	*MB*	29261.756			3426.446	20	*WA*	29176.393	$2382°_{4\frac{1}{2}} - 31558_{3\frac{1}{2}}$	13
3416.565	80	*MB*	29260.771	$5964°_{3\frac{1}{2}} - 35225_{2\frac{1}{2}}$	11	3426.580	70	*MB*	29175.252	$2563°_{5\frac{1}{2}} - 31738_{5\frac{1}{2}}$	1
3416.855	130	*MB*	29258.287	$9634°_{1\frac{1}{2}} - 38892_{0\frac{1}{2}}$	−27	3426.890	10	*MB*	29172.612	$8169°_{1\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−16
				$987°_{4\frac{1}{2}} - 30245_{4\frac{1}{2}}$	20	3426.922	7	*MB*	29172.340		
3416.946	15	*MB*	29257.508			3427.089	35	*MB*	29170.919	$10684°_{0\frac{1}{2}} - 39855_{0\frac{1}{2}}$	−38
3417.145	7	*WA*	29255.804	$2595°_{1\frac{1}{2}} - 31851_{2\frac{1}{2}}$	51	3427.136	30	*WA*	29170.519	$2595°_{1\frac{1}{2}} - 31766_{1\frac{1}{2}}$	54
3417.446	260	*MB*	29253.228	$5675°_{4\frac{1}{2}} - 34928_{4\frac{1}{2}}$	22	3427.293	30	*MB*	29169.182	$1873°_{3\frac{1}{2}} - 31043_{2\frac{1}{2}}$	7
3417.655	20	*MB*	29251.439	$4322°_{2\frac{1}{2}} - 33574_{1\frac{1}{2}}$	2	3427.426	12	*MB*	29168.051		
3417.863	25	*MB*	29249.659	$8280°_{2\frac{1}{2}} - 37530_{1\frac{1}{2}}$	−27	3427.608	30	*MB*	29166.502	$8175°_{2\frac{1}{2}} - 37342_{2\frac{1}{2}}$	38
3417.891	70	*MB*	29249.419	$8402°_{3\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−3	3428.064	20	*MB*	29162.622	$17000_{3\frac{1}{2}} - 46162°_{4\frac{1}{2}}$	−62
3417.927	25	*MB*	29249.111	$11949°_{3\frac{1}{2}} - 41198_{2\frac{1}{2}}$	−8	3428.189	7	*MB*	29161.559		
3418.155	2	*MB*	29247.160			3428.474	15	*MB*	29159.135	$3703°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−37
3418.276	2	*MB*	29246.125			3428.513	30	*MB*	29158.803	$9778°_{2\frac{1}{2}} - 38937_{1\frac{1}{2}}$	−26
3418.406	5	*MB*	29245.013	$5675°_{4\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−11	3428.697	30	*WA*	29157.238	$2581°_{4\frac{1}{2}} - 31738_{5\frac{1}{2}}$	12
3418.687	5	*MB*	29242.609			3428.956	20	*MB*	29155.036		
3418.838	20	*MB*	29241.317			3429.150	20	*MB*	29153.387		
3418.921	90	*MB*	29240.607	$12751°_{5\frac{1}{2}} - 41992_{6\frac{1}{2}}$	34	3429.180	20	*MB*	29153.132	$3995°_{3\frac{1}{2}} - 33148_{2\frac{1}{2}}$	3
3419.246	30	*MB*	29237.828	$7278°_{1\frac{1}{2}} - 36516_{1\frac{1}{2}}$	−47	3429.492	15	*MB*	29150.480		
3419.526	2	*MB*	29235.434			3429.632	30	*MB*	29149.290		
3419.660	15	*MB*	29234.289			3429.831	25	*MB*	29147.598	$7746°_{2\frac{1}{2}} - 36893_{3\frac{1}{2}}$	14
3419.817	20	*MB*	29232.947			3429.866	30	*MB*	29147.301	$987°_{4\frac{1}{2}} - 30134_{5\frac{1}{2}}$	2
3420.175	130	*MB*	29229.887	$4322°_{2\frac{1}{2}} - 33552_{2\frac{1}{2}}$	13	3429.950	10	*MB*	29146.587		
3420.407	10	*MB*	29227.904			3430.004	2	*MB*	29146.128	$8702°_{1\frac{1}{2}} - 37848_{2\frac{1}{2}}$	23
3420.533	35	*MB*	29226.828	$7061°_{0\frac{1}{2}} - 36288_{0\frac{1}{2}}$	7	3430.252	40	*WA*	29144.021	$3363°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	6
3420.709	2	*MB*	29225.324			3430.312	120	*MB*	29143.511	$7059°_{4\frac{1}{2}} - 36202_{4\frac{1}{2}}$	27
3420.863	7	*MB*	29224.008							$4266°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	12
3421.540	30	*MB*	29218.226	$5716°_{3\frac{1}{2}} - 34934_{2\frac{1}{2}}$	19	3430.588	20	*MB*	29141.167	$12057°_{2\frac{1}{2}} - 41198_{2\frac{1}{2}}$	−34
3421.714	20	*WA*	29216.740	$2634°_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	10	3430.665	30	*MB*	29140.513	$15510_{0\frac{1}{2}} - 44651°_{1\frac{1}{2}}$	−3
3421.879	15	*MB*	29215.332			3430.841	40	*MB*	29139.018	$4737°_{2\frac{1}{2}} - 33876_{1\frac{1}{2}}$	14
3422.000	25	*MB*	29214.299	$5118°_{2\frac{1}{2}} - 34333_{2\frac{1}{2}}$	7	3430.898	7	*MB*	29138.534		
3422.421	40	*MB*	29210.705	$7713°_{4\frac{1}{2}} - 36923_{4\frac{1}{2}}$	5	3431.016	125	*MB*	29137.532	$19950_{6\frac{1}{2}} - 49087°_{7\frac{1}{2}}$	−7
3422.485	40	*MB*	29210.159	$8927°_{5\frac{1}{2}} - 38137_{5\frac{1}{2}}$	−8	3431.085	20	*MB*	29136.946	$4523°_{4\frac{1}{2}} - 33659_{5\frac{1}{2}}$	11
3422.522	40	*MB*	29209.843	$2641°_{3\frac{1}{2}} - 31851_{2\frac{1}{2}}$	5	3431.194	40	*MB*	29136.020	$11949°_{3\frac{1}{2}} - 41085_{3\frac{1}{2}}$	−4
3422.708	550	*MT*	29208.256	$3593°_{4\frac{1}{2}} - 32802_{5\frac{1}{2}}$	−26	3431.252	20	*MB*	29135.528	$17851°_{0\frac{1}{2}} - 46987_{1\frac{1}{2}}$	−39

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3431.371	10	*MB*	29134.517			3441.398	30	*MB*	29049.632	$3995°_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−2
3431.427	25	*MB*	29134.042	$11949°_{3\frac{1}{2}} - 41083_{4\frac{1}{2}}$	−62	3441.622	7	*MB*	29047.742		
3431.494	60	*PK*	29133.473	$4910°_{5\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−4	3441.682	2	*MB*	29047.235	$5118°_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	3
3431.734	30	*MB*	29131.436	$2634°_{2\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−6	3441.894	10	*WA*	29045.446	$7878°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−14
3432.480	7	*MB*	29125.105			3441.956	7	*MB*	29044.923		
3432.650	5	*MB*	29123.662			3442.022	7	*MB*	29044.366		
3432.767	25	*MB*	29122.670	$12466°_{1\frac{1}{2}} - 41589_{0\frac{1}{2}}$	−34	3442.081	15	*MB*	29043.868	$15593_{6\frac{1}{2}} - 44637°_{6\frac{1}{2}}$	−19
3433.079	160	*MB*	29120.023	$10274°_{3\frac{1}{2}} - 39394_{3\frac{1}{2}}$	1	3442.183	30	*MB*	29043.008	$8927°_{5\frac{1}{2}} - 37970_{5\frac{1}{2}}$	−9
3433.305	5	*MB*	29118.106			3442.381	130	*MB*	29041.337	$4511°_{2\frac{1}{2}} - 33552_{2\frac{1}{2}}$	13
3433.498	15	*MB*	29116.470			3442.555	10	*MB*	29039.869	$10798°_{2\frac{1}{2}} - 39838_{2\frac{1}{2}}$	−20
3433.566	25	*MB*	29115.893	$11742°_{5\frac{1}{2}} - 40858_{4\frac{1}{2}}$	−66	3442.954	60	*MB*	29036.504	$5118°_{2\frac{1}{2}} - 34155_{3\frac{1}{2}}$	0
3433.684	35	*MB*	29114.892	$3745°_{1\frac{1}{2}} - 32860_{0\frac{1}{2}}$	15	3443.088	5	*MB*	29035.374		
3433.899	30	*MB*	29113.069			3443.522	35	*MB*	29031.715	$4844°_{1\frac{1}{2}} - 33876_{1\frac{1}{2}}$	−17
3434.175	10	*MB*	29110.730			3443.678	25	*MB*	29030.400	$4266°_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−7
3434.198	12	*MB*	29110.535			3443.950	2	*MB*	29028.107	$12057°_{2\frac{1}{2}} - 41085_{3\frac{1}{2}}$	0
3434.280	20	*MB*	29109.840	$5819°_{4\frac{1}{2}} - 34928_{4\frac{1}{2}}$	−15	3444.088	5	*MB*	29026.944		
3434.793	10	*MB*	29105.492			3444.180	25	*MB*	29026.169	$7818°_{1\frac{1}{2}} - 36844_{2\frac{1}{2}}$	11
3435.203	25	*MB*	29102.019	$8702°_{1\frac{1}{2}} - 37804_{1\frac{1}{2}}$	29	3444.342	10	*MB*	29024.803		
3435.241	20	*MB*	29101.697	$5819°_{4\frac{1}{2}} - 34920_{3\frac{1}{2}}$	22	3444.581	10	*MB*	29022.790		
3435.416	20	*MB*	29100.214			3444.736	12	*MB*	29021.484	$13012°_{2\frac{1}{2}} - 42033_{2\frac{1}{2}}$	−73
3435.660	25	*MB*	29098.148	$7746°_{2\frac{1}{2}} - 36844_{2\frac{1}{2}}$	28	3444.787	30	*MB*	29021.054	$10058_{6\frac{1}{2}} - 39079°_{5\frac{1}{2}}$	−17
3435.803	15	*MB*	29096.937	$5716°_{3\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−48	3445.104	20	*MB*	29018.384	$14315°_{0\frac{1}{2}} - 43334_{0\frac{1}{2}}$	−17
3435.840	10	*MB*	29096.623	$13436_{2\frac{1}{2}} - 42533°_{1\frac{1}{2}}$	19	3445.305	12	*MB*	29016.691	$17571_{4\frac{1}{2}} - 46588°_{5\frac{1}{2}}$	−38
3436.304	30	*MB*	29092.694	$4459°_{3\frac{1}{2}} - 33552_{2\frac{1}{2}}$	−15	3445.555	2	*MB*	29014.586		
3436.558	5	*MB*	29090.544	$15803_{4\frac{1}{2}} - 44893°_{3\frac{1}{2}}$	−84	3445.673	5	*MB*	29013.592		
3436.727	3	*WA*	29089.114			3445.879	7	*MB*	29011.858		
3436.906	20	*MB*	29087.599			3446.075	15	*MB*	29010.208	$5924°_{1\frac{1}{2}} - 34934_{2\frac{1}{2}}$	−10
3436.956	25	*MB*	29087.176	$4322°_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−12	3446.230	25	*MB*	29008.903		
3437.080	20	*MB*	29086.126	$9723°_{4\frac{1}{2}} - 38809_{3\frac{1}{2}}$	−14	3446.679	7	*MB*	29005.124		
3437.324	40	*WA*	29084.062	$3995°_{3\frac{1}{2}} - 33079_{3\frac{1}{2}}$	10	3446.720	80	*MB*	29004.779	$2563°_{5\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−6
3437.537	15	*MB*	29082.260			3446.851	25	*MB*	29003.677	$12097_{3\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	21
3437.804	40	*MB*	29080.001			3447.269	35	*MB*	29000.160	$9269°_{0\frac{1}{2}} - 38269_{0\frac{1}{2}}$	12
3437.915	10	*MB*	29079.062			3447.615	12	*MB*	28997.249	$16133_{2\frac{1}{2}} - 45130°_{2\frac{1}{2}}$	−85
3438.063	45	*MB*	29077.810	$6638°_{4\frac{1}{2}} - 35716_{5\frac{1}{2}}$	−14	3447.964	15	*MB*	28994.314	$7522°_{0\frac{1}{2}} - 36516_{1\frac{1}{2}}$	−25
3438.185	7	*MB*	29076.779			3448.192	2	*MB*	28992.397		
3438.294	20	*MB*	29075.857			3448.280	35	*MB*	28991.658	$5942°_{3\frac{1}{2}} - 34934_{2\frac{1}{2}}$	33
3438.330	10	*MB*	29075.552			3448.447	15	*MB*	28990.254		
3438.429	15	*MB*	29074.715	$15576_{1\frac{1}{2}} - 44651°_{1\frac{1}{2}}$	−19	3448.529	2	*MB*	28989.564		
3438.877	25	*MB*	29070.928	$4737°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−15	3448.644	25	*MB*	28988.598	$5437°_{3\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−16
3438.986	2	*MB*	29070.006			3448.862	15	*MB*	28986.765	$2581°_{4\frac{1}{2}} - 31568_{4\frac{1}{2}}$	4
3439.121	2	*MB*	29068.865	$19481_{4\frac{1}{2}} - 48549°_{4\frac{1}{2}}$	−84	3448.925	10	*MB*	28986.236	$5942°_{3\frac{1}{2}} - 34928_{4\frac{1}{2}}$	65
3439.634	10	*MB*	29064.530			3449.002	2	*MB*	28985.589		
3439.829	130	*MB*	29062.882	$4511°_{2\frac{1}{2}} - 33574_{1\frac{1}{2}}$	−5	3449.843	7	*MB*	28978.523	$14481°_{2\frac{1}{2}} - 43460_{2\frac{1}{2}}$	−79
3439.971	10	*MB*	29061.683			3449.905	30	*MB*	28978.002	$5942°_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	12
3439.997	7	*MB*	29061.463	$8280°_{2\frac{1}{2}} - 37342_{2\frac{1}{2}}$	82	3449.978	30	*MB*	28977.389	$2581°_{4\frac{1}{2}} - 31558_{3\frac{1}{2}}$	20
3440.455	35	*MB*	29057.594	$5455°_{7\frac{1}{2}} - 34513_{6\frac{1}{2}}$	−28	3450.042	2	*MB*	28976.851		
3440.489	35	*MB*	29057.307	$13515°_{3\frac{1}{2}} - 42573_{3\frac{1}{2}}$	−30	3450.226	35	*MB*	28975.306	$4201°_{1\frac{1}{2}} - 33177_{0\frac{1}{2}}$	3
3440.576	30	*MB*	29056.573	$8175°_{2\frac{1}{2}} - 37232_{1\frac{1}{2}}$	−1	3450.250	25	*MB*	28975.105		
3441.008	12	*MB*	29052.925	$7059°_{4\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−23	3450.330	20	*MB*	28974.433		
3441.205	260	*MB*	29051.262	$2879°_{5\frac{1}{2}} - 31930_{4\frac{1}{2}}$	21	3450.715	25	*MB*	28971.200	$3745°_{1\frac{1}{2}} - 32716_{2\frac{1}{2}}$	29

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3450.911	25	*MB*	28969.555	$5964°_{3\frac{1}{2}}-34934_{2\frac{1}{2}}$	28	3461.134	15	*MB*	28883.991		
3451.305	10	*MB*	28966.248	$5010°_{2\frac{1}{2}}-33977_{3\frac{1}{2}}$	−21	3461.344	90	*WA*	28882.239	$4266°_{3\frac{1}{2}}-33148_{2\frac{1}{2}}$	47
3451.336	20	*MB*	28965.988	$7878°_{3\frac{1}{2}}-36844_{2\frac{1}{2}}$	11	3461.479	5	*MB*	28881.113		
3451.563	70	*MB*	28964.083	$5964°_{3\frac{1}{2}}-34928_{4\frac{1}{2}}$	10	3461.788	40	*WA*	28878.535	$7259°_{3\frac{1}{2}}-36137_{2\frac{1}{2}}$	6
3451.623	40	*MB*	28963.579	$12326°_{6\frac{1}{2}}-41289_{5\frac{1}{2}}$	25	3462.233	25	*MB*	28874.823	$4165_{4\frac{1}{2}}-33040°_{4\frac{1}{2}}$	20
3451.903	20	*WA*	28961.230	$9491°_{6\frac{1}{2}}-38452_{11/2}$	−26	3462.763	20	*WA*	28870.404	$5942°_{3\frac{1}{2}}-34813_{2\frac{1}{2}}$	0
3452.055	15	*MB*	28959.955	$5969°_{5\frac{1}{2}}-34928_{4\frac{1}{2}}$	−6	3462.808	15	*MB*	28870.028		
3452.511	10	*MB*	28956.130			3463.133	40	*MB*	28867.319	$3995°_{3\frac{1}{2}}-32862_{3\frac{1}{2}}$	13
3452.537	35	*MB*	28955.912	$5964°_{3\frac{1}{2}}-34920_{3\frac{1}{2}}$	20	3463.214	90	*MB*	28866.644	$7059°_{4\frac{1}{2}}-35925_{3\frac{1}{2}}$	34
3452.619	30	*MB*	28955.224	$1873°_{3\frac{1}{2}}-30829_{3\frac{1}{2}}$	34	3463.347	30	*MB*	28865.536	$5010°_{2\frac{1}{2}}-33876_{11/2}$	29
3452.674	15	*MB*	28954.763	$3363°_{2\frac{1}{2}}-32318_{3\frac{1}{2}}$	15	3463.604	20	*MB*	28863.394		
3452.922	10	*MB*	28952.683			3463.756	90	*MB*	28862.127	$5651°_{5\frac{1}{2}}-34513_{6\frac{1}{2}}$	17
3453.060	15	*WA*	28951.526	$8280°_{2\frac{1}{2}}-37232_{11/2}$	35	3464.154	90	*MB*	28858.811	$2879°_{5\frac{1}{2}}-31738_{5\frac{1}{2}}$	23
3453.240	30	*MB*	28950.017	$4459°_{3\frac{1}{2}}-33409_{3\frac{1}{2}}$	−7	3464.208	70	*MB*	28858.362	$5118°_{2\frac{1}{2}}-33977_{3\frac{1}{2}}$	28
3453.281	25	*MB*	28949.674	$8702°_{1\frac{1}{2}}-37652_{2\frac{1}{2}}$	27	3464.247	7	*MB*	28858.037	$5437°_{3\frac{1}{2}}-34295_{4\frac{1}{2}}$	9
3453.637	15	*MB*	28946.689	$4201°_{1\frac{1}{2}}-33148_{2\frac{1}{2}}$	−6	3464.298	25	*MB*	28857.612		
3453.763	20	*MB*	28945.634	$4165_{4\frac{1}{2}}-33111°_{3\frac{1}{2}}$	21	3464.856	45	*MB*	28852.965	$7259°_{3\frac{1}{2}}-36112_{3\frac{1}{2}}$	19
3453.865	15	*MB*	28944.779			3464.985	45	*MB*	28851.890	$14315°_{6\frac{1}{2}}-43167_{11/2}$	−57
3454.017	20	*MB*	28943.505	$7259°_{3\frac{1}{2}}-36202_{4\frac{1}{2}}$	23	3465.277	35	*MB*	28849.459		
3454.251	40	*MB*	28941.544			3465.309	30	*MB*	28849.193	$10088°_{1\frac{1}{2}}-38937_{11/2}$	17
3454.323	15	*MB*	28940.941			3465.413	35	*MB*	28848.327	$5964°_{3\frac{1}{2}}-34813_{2\frac{1}{2}}$	21
3454.471	50	*WA*	28939.701	$6517°_{2\frac{1}{2}}-35457_{11/2}$	2	3465.503	35	*MB*	28847.578	$19483_{2\frac{1}{2}}-48330°_{3\frac{1}{2}}$	13
3454.517	15	*MB*	28939.316							$11007°_{1\frac{1}{2}}-39855_{6\frac{1}{2}}$	−21
3454.663	12	*MB*	28938.093			3465.574	12	*MB*	28846.987	$15576_{11/2}-44423°_{1\frac{1}{2}}$	−19
3454.911	20	*WA*	28936.016	$6521°_{1\frac{1}{2}}-35457_{11/2}$	30	3465.697	12	*MB*	28845.963		
3455.023	25	*MB*	28935.078	$7202°_{2\frac{1}{2}}-36137_{2\frac{1}{2}}$	3	3465.930	5	*MB*	28844.024		
3455.132	10	*MB*	28934.165			3466.006	7	*MB*	28843.392	$5924°_{1\frac{1}{2}}-34767_{11/2}$	−91
3455.471	25	*MB*	28931.326	$11742°_{5\frac{1}{2}}-40673_{5\frac{1}{2}}$	−3	3466.032	30	*MB*	28843.175	$4201°_{1\frac{1}{2}}-33045_{2\frac{1}{2}}$	−26
3456.332	50	*MB*	28924.120	$12365°_{4\frac{1}{2}}-41289_{5\frac{1}{2}}$	−44	3466.794	40	*MB*	28836.836	$4737°_{2\frac{1}{2}}-33574_{11/2}$	64
3456.668	40	*MB*	28921.308	$987°_{4\frac{1}{2}}-29908_{4\frac{1}{2}}$	15	3466.945	50	*MB*	28835.580	$1410°_{4\frac{1}{2}}-30245_{4\frac{1}{2}}$	6
3456.766	90	*MB*	28920.488	$6638°_{4\frac{1}{2}}-35558_{3\frac{1}{2}}$	44	3467.776	40	*MT*	28828.670	$6517°_{2\frac{1}{2}}-35346_{3\frac{1}{2}}$	7
3456.936	5	*MB*	28919.066							$1873°_{3\frac{1}{2}}-30702_{4\frac{1}{2}}$	−5
3457.175	40	*MB*	28917.067	$2641°_{3\frac{1}{2}}-31558_{3\frac{1}{2}}$	0	3467.925	10	*MB*	28827.431		
3457.356	7	*MB*	28915.553			3468.108	90	*MB*	28825.910	$4322°_{2\frac{1}{2}}-33148_{2\frac{1}{2}}$	30
3457.417	7	*MB*	28915.043			3468.352	10	*MB*	28823.882		
3457.558	30	*MB*	28913.864	$13659°_{4\frac{1}{2}}-42573_{3\frac{1}{2}}$	2	3468.374	40	*MB*	28823.700	$4165_{4\frac{1}{2}}-32989°_{3\frac{1}{2}}$	32
3457.620	5	*MB*	28913.345	$8702°_{1\frac{1}{2}}-37615_{0\frac{1}{2}}$	56	3468.467	20	*MB*	28822.927	$10114°_{2\frac{1}{2}}-38937_{11/2}$	−5
3457.990	12	*MB*	28910.252			3468.696	35	*MB*	28821.024	$2140°_{0\frac{1}{2}}-30961_{11/2}$	−1
3458.208	45	*MB*	28908.429			3468.785	7	*MB*	28820.285		
3458.853	35	*MB*	28903.039	$8175°_{2\frac{1}{2}}-37078_{11/2}$	23	3468.883	50	*MB*	28819.471	$987°_{4\frac{1}{2}}-29807_{3\frac{1}{2}}$	4
										$3593°_{4\frac{1}{2}}-32413_{3\frac{1}{2}}$	7
3459.385	2	*WA*	28898.594	$4511°_{2\frac{1}{2}}-33409_{3\frac{1}{2}}$	−45						
3459.437	20	*WA*	28898.160	$3593°_{4\frac{1}{2}}-32492_{5\frac{1}{2}}$	4	3468.995	20b	*MB*	28818.540	$9723°_{4\frac{1}{2}}-38541_{4\frac{1}{2}}$	2
3459.736	5	*WA*	28895.662	$5437°_{3\frac{1}{2}}-34333_{2\frac{1}{2}}$	−13					$9634°_{1\frac{1}{2}}-38452_{11/2}$	−23
3459.833	70	*WA*	28894.852	$9634°_{1\frac{1}{2}}-38529_{2\frac{1}{2}}$	17	3469.199	2	*MB*	28816.845		
3460.097	20	*MB*	28892.648	$3745°_{1\frac{1}{2}}-32638_{11/2}$	−41	3469.394	40	*MB*	28815.226	$4737°_{2\frac{1}{2}}-33552_{2\frac{1}{2}}$	17
3460.160	40	*MB*	28892.122	$2140°_{0\frac{1}{2}}-31032_{0\frac{1}{2}}$	3	3469.875	10	*MB*	28811.232		
3460.199	15	*MB*	28891.796			3470.213	7	*MB*	28808.425		
3460.377	2	*MB*	28890.310			3470.396	40	*MB*	28806.906	$987°_{4\frac{1}{2}}-29794_{3\frac{1}{2}}$	1
3460.581	20	*MB*	28888.607	$19136°_{2\frac{1}{2}}-48024_{2\frac{1}{2}}$	−43	3470.504	7	*WA*	28806.010	$3508°_{0\frac{1}{2}}-32314_{0\frac{1}{2}}$	11
3460.790	15	*MB*	28886.862	$4523°_{4\frac{1}{2}}-33409_{3\frac{1}{2}}$	−1	3470.614	25	*MB*	28805.097		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3470.748	7	*MB*	28803.985			3480.340	30	*MB*	28724.602	$1410°_{4\,1/2}-30134_{5\,1/2}$	−3
3470.995	20	*MB*	28801.935			3480.376	40	*WA*	28724.305	$3593°_{4\,1/2}-32318_{3\,1/2}$	12
3471.129	10	*MB*	28800.823			3480.437	7	*MB*	28723.801	$5283°_{0\,1/2}-34006_{0\,1/2}$	9
3471.160	15	*MB*	28800.566			3480.521	7	*MB*	28723.108	$7202°_{2\,1/2}-35925_{3\,1/2}$	−44
3471.272	35	*MB*	28799.637			3480.612	25	*MB*	28722.357	$4322°_{2\,1/2}-33045_{2\,1/2}$	−29
3471.479	10	*MB*	28797.920	$8280°_{2\,1/2}-37078_{1\,1/2}$	−12	3480.759	20	*MB*	28721.144	$3995°_{3\,1/2}-32716_{2\,1/2}$	−42
3471.537	20	*MB*	28797.438	$5010°_{2\,1/2}-33808_{2\,1/2}$	−8	3480.972	70	*MB*	28719.387	$12365°_{4\,1/2}-41085_{3\,1/2}$	−20
3471.642	25	*MB*	28796.568	$16152_{3\,1/2}-44949°_{4\,1/2}$	−65	3481.152	70	*MB*	28717.902	$8175°_{2\,1/2}-36893_{3\,1/2}$	−4
3471.814	5	*MB*	28795.141							$5437°_{3\,1/2}-34155_{3\,1/2}$	13
3471.924	10	*MB*	28794.229			3481.202	15	*MB*	28717.489	$12365°_{4\,1/2}-41083_{4\,1/2}$	2
3472.017	40	*MB*	28793.458	$8402°_{3\,1/2}-37196_{4\,1/2}$	−12	3481.504	12	*MB*	28714.998		
3472.142	12	*MB*	28792.421			3481.748	12	*MB*	28712.986		
3472.278	2	*MB*	28791.293			3482.133	130	*MB*	28709.812	$5716°_{3\,1/2}-34426_{2\,1/2}$	−8
3472.762	10	*MB*	28787.281			3482.199	25	*MB*	28709.267		
3473.027	25	*MB*	28785.084			3482.348	220	*MB*	28708.039	$6638°_{4\,1/2}-35346_{3\,1/2}$	15
										$6517°_{2\,1/2}-35225_{2\,1/2}$	2
3473.128	35	*MB*	28784.247	$8804°_{4\,1/2}-37588_{3\,1/2}$	−1						
3473.708	50	*MB*	28779.441			3482.413	40	*MB*	28707.503	$2382°_{4\,1/2}-31089_{5\,1/2}$	18
3473.799	40	*MB*	28778.687	$4266°_{3\,1/2}-33045_{2\,1/2}$	−10	3482.799	30	*MB*	28704.322	$6521°_{1\,1/2}-35225_{2\,1/2}$	−1
3473.927	20	*MB*	28777.627			3482.928	2	*MB*	28703.259		
3474.210	70	*MB*	28775.283	$3363°_{2\,1/2}-32138_{2\,1/2}$	12	3482.976	12	*MB*	28702.863		
3474.394	20	*MB*	28773.759	$4523°_{4\,1/2}-33296_{4\,1/2}$	−12	3483.077	2	*MB*	28702.031		
3474.433	2	*MB*	28773.436	$2595°_{1\,1/2}-31369_{2\,1/2}$	−12	3483.317	15	*MB*	28700.053	$13758°_{1\,1/2}-42458_{1\,1/2}$	−19
3474.585	2	*MB*	28772.177			3483.492	25	*MB*	28698.612	$7818°_{1\,1/2}-36516_{1\,1/2}$	−38
3474.778	25	*MB*	28770.579	$7746°_{2\,1/2}-36516_{1\,1/2}$	−33	3483.512	8	*WA*	28698.447	$3793°_{6\,1/2}-32492_{5\,1/2}$	43
3474.992	10	*MB*	28768.808			3483.705	5	*MB*	28696.857		
3475.278	10	*MB*	28766.440			3483.825	5	*MB*	28695.868		
3475.565	10	*MB*	28764.065			3483.982	35	*MB*	28694.575	$10114°_{2\,1/2}-38809_{3\,1/2}$	−17
3475.666	90	*MB*	28763.229	$1873°_{3\,1/2}-30637_{2\,1/2}$	6	3484.132	12	*MB*	28693.340	$2382°_{4\,1/2}-31075_{4\,1/2}$	−16
3475.957	15	*MB*	28760.821	$16133_{2\,1/2}-44893°_{3\,1/2}$	76	3484.338	10	*MB*	28691.644		
3476.123	7	*MB*	28759.448			3484.599	40	*MB*	28689.495	$5118°_{2\,1/2}-33808_{2\,1/2}$	−15
3476.351	50	*MB*	28757.561	$5118°_{2\,1/2}-33876_{1\,1/2}$	−9	3484.695	50	*MB*	28688.704	$4459°_{3\,1/2}-33148_{2\,1/2}$	−12
3476.433	2	*MB*	28756.883	$4322°_{2\,1/2}-33079_{3\,1/2}$	79	3484.739	70	*MB*	28688.342	$2879°_{5\,1/2}-31568_{4\,1/2}$	18
3476.531	5	*MB*	28756.073			3485.046	650	*MB*	28685.815	$0°_{3\,1/2}-28685_{2\,1/2}$	57
3476.570	35	*MB*	28755.750	$1410°_{4\,1/2}-30166_{3\,1/2}$	−2	3485.556	7	*MB*	28681.618		
3476.830	440	*MB*	28753.600	$10641°_{2\,1/2}-39394_{3\,1/2}$	49	3485.730	15	*MB*	28680.186	$6517°_{2\,1/2}-35197_{1\,1/2}$	−34
3477.000	25	*MB*	28752.194			3485.767	20	*MB*	28679.882	$7522°_{5\,1/2}-36202_{4\,1/2}$	−52
3477.265	20	*MB*	28750.003	$9778°_{2\,1/2}-38529_{2\,1/2}$	−31	3486.266	45	*MB*	28675.777	$6549°_{2\,1/2}-35225_{2\,1/2}$	29
3477.388	30	*MB*	28748.986	$4910°_{5\,1/2}-33659_{5\,1/2}$	−18	3486.414	7	*MB*	28674.560	$8169°_{1\,1/2}-36844_{2\,1/2}$	−46
3477.446	40	*MB*	28748.506	$7059°_{4\,1/2}-35807_{4\,1/2}$	11	3486.493	35	*MB*	28673.910	$13784°_{1\,1/2}-42458_{1\,1/2}$	1
3477.557	7	*MB*	28747.589			3486.520	7	*MB*	28673.688	$9778°_{2\,1/2}-38452_{1\,1/2}$	−75
3477.631	12	*MB*	28746.977			3486.663	20	*MB*	28672.512	$4737°_{2\,1/2}-33409_{3\,1/2}$	−11
3477.984	40	*MB*	28744.059	$10088°_{1\,1/2}-38832_{2\,1/2}$	−9	3487.155	40	*MB*	28668.467	$8175°_{2\,1/2}-36844_{2\,1/2}$	25
3479.016	60	*MB*	28735.533			3487.381	20	*MB*	28666.609	$7259°_{3\,1/2}-35925_{3\,1/2}$	2
3479.153	10	*MB*	28734.402	$2634°_{2\,1/2}-31369_{2\,1/2}$	−24	3487.540	5	*MB*	28665.302		
3479.397	10	*MB*	28732.387			3487.624	5	*MB*	28664.611		
3479.598	90	*MB*	28730.727	$0°_{3\,1/2}-28730_{3\,1/2}$	15	3488.016	10	*MB*	28661.390		
3479.742	30	*MB*	28729.538	$11309_{7\,1/2}-40039°_{6\,1/2}$	−13	3488.100	15	*MB*	28660.700		
3479.981	25	*MB*	28727.565	$2641°_{3\,1/2}-31369_{2\,1/2}$	31	3488.375	25	*MB*	28658.441	$4201°_{1\,1/2}-32860_{0\,1/2}$	−18
				$4322°_{2\,1/2}-33050_{1\,1/2}$	−17	3488.548	160	*MB*	28657.019	$7059°_{4\,1/2}-35716_{5\,1/2}$	9
3480.273	60	*WA*	28725.155	$0°_{3\,1/2}-28725_{4\,1/2}$	7	3488.811	20	*WA*	28654.859	$1410°_{4\,1/2}-30065_{3\,1/2}$	0

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3488.882	10	*MB*	28654.276			3499.298	15	*MB*	28568.986	$3745°_{1\frac{1}{2}} - 32314_{0\frac{1}{2}}$	−7
3489.208	10	*MB*	28651.599			3499.388	10	*MB*	28568.252	$4511°_{2\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−2
3489.282	5	*MB*	28650.991			3499.620	10	*MB*	28566.358	$2641°_{3\frac{1}{2}} - 31207_{3\frac{1}{2}}$	−9
3489.379	15	*WA*	28650.195	$9198°_{3\frac{1}{2}} - 37848_{2\frac{1}{2}}$	−28	3499.773	20	*MB*	28565.109		
3489.654	35	*MB*	28647.937	$6549°_{2\frac{1}{2}} - 35197_{1\frac{1}{2}}$	5	3499.994	35	*MB*	28563.305	$5010°_{2\frac{1}{2}} - 33574_{1\frac{1}{2}}$	31
3489.708	2	*MB*	28647.494			3500.064	25	*MB*	28562.734		
3490.123	130	*MB*	28644.088	$5651°_{5\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−4	3500.206	2	*MB*	28561.575		
3490.713	15	*WA*	28639.246	$2595°_{1\frac{1}{2}} - 31234_{2\frac{1}{2}}$	12	3500.356	5	*MB*	28560.351		
3490.852	5	*MB*	28638.106			3500.604	5	*MB*	28558.328		
3490.947	5	*MB*	28637.327	$4511°_{2\frac{1}{2}} - 33148_{2\frac{1}{2}}$	−4	3500.677	50b	*MB*	28557.733	$10274°_{3\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−4
3491.084	2	*MB*	28636.203			3500.805	10	*MB*	28556.688		
3491.128	5	*MB*	28635.842	$9634°_{1\frac{1}{2}} - 38269_{0\frac{1}{2}}$	54	3500.831	25	*MB*	28556.476	$4523°_{4\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−2
3491.187	7	*MB*	28635.358			3501.031	5	*MT*	28554.845		
3491.278	2	*MB*	28634.612			3501.202	2	*MB*	28553.451		
3491.791	2	*MB*	28630.405			3501.453	150	*MB*	28551.404	$1873°_{3\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−10
3492.101	7	*MB*	28627.863			3501.810	30	*MB*	28548.493	$7259°_{3\frac{1}{2}} - 35807_{4\frac{1}{2}}$	1
3492.247	20	*WA*	28626.667	$2581°_{4\frac{1}{2}} - 31207_{3\frac{1}{2}}$	−2	3501.950	7	*MB*	28547.352		
3492.427	12	*MB*	28625.191			3502.105	5	*MB*	28546.088		
3492.981	25	*MB*	28620.651			3502.219	5	*MB*	28545.159		
3493.103	80	*WA*	28619.652	$5675°_{4\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−34	3502.316	5	*MB*	28544.369	$5969°_{5\frac{1}{2}} - 34513_{6\frac{1}{2}}$	−91
				$4459°_{3\frac{1}{2}} - 33079_{3\frac{1}{2}}$	12						
						3502.419	5	*MB*	28543.529		
3493.449	7	*WA*	28616.817	$5716°_{3\frac{1}{2}} - 34333_{2\frac{1}{2}}$	−64	3502.639	25	*MB*	28541.737	$5010°_{2\frac{1}{2}} - 33552_{2\frac{1}{2}}$	25
3493.529	10	*MB*	28616.162			3502.854	15	*MB*	28539.985	$4322°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−73
3493.724	90	*WA*	28614.565	$3703°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−15	3502.889	30	*WA*	28539.700	$5437°_{3\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−17
3493.833	2	*MB*	28613.672			3502.976	25	*MB*	28538.991	$6389°_{4\frac{1}{2}} - 34928_{4\frac{1}{2}}$	−35
										$4511°_{2\frac{1}{2}} - 33050_{1\frac{1}{2}}$	−42
3493.936	20	*MB*	28612.829	$8280°_{2\frac{1}{2}} - 36893_{3\frac{1}{2}}$	5						
3493.989	12	*MB*	28612.395			3503.077	50	*MB*	28538.168	$12751°_{5\frac{1}{2}} - 41289_{5\frac{1}{2}}$	−20
3494.246	2	*MB*	28610.290			3503.220	20	*MB*	28537.003		
3494.646	30	*WA*	28607.016	$5437°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−2	3503.342	1	*WA*	28536.009	$2634°_{2\frac{1}{2}} - 31170_{1\frac{1}{2}}$	31
3494.837	7	*MB*	28605.452			3503.529	18	*MB*	28534.486	$10274°_{3\frac{1}{2}} - 38809_{3\frac{1}{2}}$	−18
3495.001	70	*WA*	28604.110	$3593°_{4\frac{1}{2}} - 32197_{4\frac{1}{2}}$	10	3503.619	25	*MB*	28533.753	$4511°_{2\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−84
3495.343	2	*MB*	28601.311			3503.779	5	*MB*	28532.450		
3495.421	10	*MB*	28600.673			3503.860	7	*MB*	28531.791		
3495.478	40	*WA*	28600.207	$2634°_{2\frac{1}{2}} - 31234_{2\frac{1}{2}}$	−5	3503.934	12	*MB*	28531.188	$11340°_{3\frac{1}{2}} - 39871_{4\frac{1}{2}}$	−46
3495.729	30	*WA*	28598.153	$12260°_{3\frac{1}{2}} - 40858_{4\frac{1}{2}}$	37	3503.977	18	*MB*	28530.838	$6389°_{4\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−7
3495.939	90	*MB*	28596.436	$10798°_{2\frac{1}{2}} - 39394_{3\frac{1}{2}}$	−1	3504.083	25	*MB*	28529.975	$8702°_{1\frac{1}{2}} - 37232_{1\frac{1}{2}}$	−18
3496.015	35	*MB*	28595.814			3504.414	1	*WA*	28527.281	$12762°_{4\frac{1}{2}} - 41289_{5\frac{1}{2}}$	−48
3496.318	70	*WA*	28593.336	$5283°_{0\frac{1}{2}} - 33876_{1\frac{1}{2}}$	−11	3504.511	25	*MB*	28526.491	$2563°_{5\frac{1}{2}} - 31089_{5\frac{1}{2}}$	−6
				$2641°_{3\frac{1}{2}} - 31234_{2\frac{1}{2}}$	16	3504.860	2	*MB*	28523.650		
3496.582	18	*MB*	28591.177			3505.173	20	*MB*	28521.103	$8402°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−17
3496.633	20	*MB*	28590.760			3505.507	3	*WA*	28518.386		
3497.009	3	*WA*	28587.686			3505.955	5	*WA*	28514.742	$4201°_{1\frac{1}{2}} - 32716_{2\frac{1}{2}}$	−11
3497.056	5	*MB*	28587.302			3506.219	15	*MB*	28512.595	$11325°_{2\frac{1}{2}} - 39838_{2\frac{1}{2}}$	−68
3497.309	20	*MT*	28585.234	$4459°_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	11	3506.249	40	*WA*	28512.351	$2563°_{5\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−18
3497.362	12	*MB*	28584.801	$11454_{6\frac{1}{2}} - 40039°_{6\frac{1}{2}}$	−21	3506.347	10	*MB*	28511.554		
3498.039	5	*MB*	28579.269	$5716°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	35	3506.722	25	*MB*	28508.505	$2581°_{4\frac{1}{2}} - 31089_{5\frac{1}{2}}$	32
3498.562	20	*WA*	28574.996	$2595°_{1\frac{1}{2}} - 31170_{1\frac{1}{2}}$	−4	3507.010	10	*MB*	28506.164	$10035°_{5\frac{1}{2}} - 38541_{4\frac{1}{2}}$	3
3498.661	20	*MB*	28574.188	$3363°_{2\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−37	3507.502	15	*MB*	28502.166		
3498.695	20	*MB*	28573.910	$7233°_{5\frac{1}{2}} - 35807_{4\frac{1}{2}}$	−30	3507.542	7	*MB*	28501.841	$5924°_{1\frac{1}{2}} - 34426_{2\frac{1}{2}}$	8
3499.188	10	*MB*	28569.884			3507.813	25	*MB*	28499.639	$7059°_{4\frac{1}{2}} - 35558_{3\frac{1}{2}}$	9

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3507.938	190	*MB*	28498.623	$1410°_{4\frac{1}{2}} - 29908_{4\frac{1}{2}}$	24	3515.283	20	*MB*	28439.079	$5716°_{3\frac{1}{2}} - 34155_{3\frac{1}{2}}$	−15
3508.034	20	*MB*	28497.844	$11340°_{3\frac{1}{2}} - 39838_{2\frac{1}{2}}$	−2	3515.387	12	*MB*	28438.237	$10454°_{1\frac{1}{2}} - 38892_{0\frac{1}{2}}$	9
3508.126	10	*MB*	28497.096			3515.514	5	*MB*	28437.210		
3508.459	80	*MB*	28494.391	$3703°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	4	3515.546	20	*MB*	28436.951	$2595°_{1\frac{1}{2}} - 31032_{0\frac{1}{2}}$	−15
3508.703	60	*MB*	28492.410	$12365°_{4\frac{1}{2}} - 40858_{4\frac{1}{2}}$	11	3515.629	40	*MB*	28436.280	$4201°_{1\frac{1}{2}} - 32638_{1\frac{1}{2}}$	8
3508.862	15	*MB*	28491.119	$8402°_{3\frac{1}{2}} - 36893_{3\frac{1}{2}}$	17	3515.774	40	*MB*	28435.107	$3703°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	3
3509.063	10	*MB*	28489.487	$7713°_{4\frac{1}{2}} - 36202_{4\frac{1}{2}}$	19	3515.907	15	*MB*	28434.031	$2641°_{3\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−12
3509.249	15	*MB*	28487.977	$3363°_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	7	3515.940	20	*MB*	28433.765	$5118°_{2\frac{1}{2}} - 33552_{2\frac{1}{2}}$	−10
3509.430	2	*MB*	28486.508			3516.008	12	*MB*	28433.215	$10646_{5\frac{1}{2}} - 39079°_{5\frac{1}{2}}$	−12
3509.723	40	*MB*	28484.130	$11387°_{3\frac{1}{2}} - 39871_{4\frac{1}{2}}$	28	3516.361	7	*MB*	28430.360		
3509.931	30	*MB*	28482.442	$7233°_{5\frac{1}{2}} - 35716_{5\frac{1}{2}}$	−13	3516.403	15	*MB*	28430.021		
3509.980	5	*MB*	28482.044			3516.520	5	*MB*	28429.075		
3510.061	2	*MB*	28481.387			3516.628	5	*MB*	28428.202		
3510.284	25	*MB*	28479.578	$5675°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	30	3516.657	12	*MB*	28427.968		
3510.460	12	*MB*	28478.150			3516.748	5	*MB*	28427.232		
3510.681	50	*MB*	28476.357	$5819°_{4\frac{1}{2}} - 34295_{4\frac{1}{2}}$	21	3516.834	2	*MB*	28426.537		
3510.773	20	*MB*	28475.611	$3793°_{6\frac{1}{2}} - 32269_{7\frac{1}{2}}$	−6	3516.892	5	*MB*	28426.068		
3510.875	5	*MB*	28474.784			3516.973	3	*MB*	28425.413		
3510.998	2	*MB*	28473.786			3517.373	550	*MB*	28422.181	$7293°_{6\frac{1}{2}} - 35716_{5\frac{1}{2}}$	36
3511.117	5	*MB*	28472.821			3517.736	10	*MB*	28419.248		
3511.200	5	*MB*	28472.148			3517.906	30	*MB*	28417.875	$3995°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−10
3511.302	12	*MB*	28471.321			3518.035	40	*MB*	28416.833	$6517°_{2\frac{1}{2}} - 34934_{2\frac{1}{2}}$	29
3511.403	12	*MB*	28470.502	$7818°_{1\frac{1}{2}} - 36288_{0\frac{1}{2}}$	−9	3518.141	5	*MB*	28415.976		
3511.459	3	*WA*	28470.048	$10924°_{4\frac{1}{2}} - 39394_{3\frac{1}{2}}$	−68	3518.187	3	*MB*	28415.605		
3511.586	40	*MB*	28469.019	$9725_{3\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	24	3518.367	50b	*MB*	28414.151	$10114°_{2\frac{1}{2}} - 38529_{2\frac{1}{2}}$	14
3511.734	15	*MB*	28467.819			3518.437	20	*MB*	28413.586		
3511.776	10	*MB*	28467.478			3518.641	5	*MB*	28411.939		
3511.895	10	*MB*	28466.514			3518.734	20	*MB*	28411.188	$4737°_{2\frac{1}{2}} - 33148_{2\frac{1}{2}}$	−27
3512.046	2	*MB*	28465.290			3518.838	2	*MB*	28410.348		
3512.312	5	*MB*	28463.134			3518.909	5	*MB*	28409.775		
3512.420	5	*MB*	28462.259			3519.071	140	*MB*	28408.467	$2634°_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	23
3512.498	7	*MB*	28461.627			3519.284	12	*MB*	28406.748		
3512.559	18	*MB*	28461.133	$5964°_{3\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−7	3519.642	20	*MB*	28403.859		
3512.685	10	*MB*	28460.112			3519.724	50	*MB*	28403.197	$6517°_{2\frac{1}{2}} - 34920_{3\frac{1}{2}}$	28
3512.820	2	*MB*	28459.018			3519.759	20	*MB*	28402.914	$4459°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	20
3513.274	25	*MB*	28455.341	$5118°_{2\frac{1}{2}} - 33574_{1\frac{1}{2}}$	2	3519.928	20	*WA*	28401.551	$2641°_{3\frac{1}{2}} - 31043_{2\frac{1}{2}}$	0
3513.469	20	*MB*	28453.761	$9198°_{3\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−3	3520.243	30	*MB*	28399.009	$5010°_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−17
3513.659	5	*MB*	28452.223			3520.314	7	*MB*	28398.437		
3513.783	40	*MB*	28451.219	$987°_{4\frac{1}{2}} - 29438_{5\frac{1}{2}}$	13	3520.517	190	*MB*	28396.799	$1410°_{4\frac{1}{2}} - 29807_{3\frac{1}{2}}$	26
3513.847	60	*MB*	28450.701	$11387°_{3\frac{1}{2}} - 39838_{2\frac{1}{2}}$	−12	3520.805	15	*WA*	28394.476	$5513_{5\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	−7
3513.900	12	*MB*	28450.271	$4266°_{3\frac{1}{2}} - 32716_{2\frac{1}{2}}$	22	3520.874	15	*MB*	28393.920	$4322°_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	−18
3514.098	12	*MB*	28448.668			3520.928	18	*MB*	28393.485		
3514.161	2	*MB*	28448.158			3520.977	40	*MB*	28393.089	$5651°_{5\frac{1}{2}} - 34044_{4\frac{1}{2}}$	6
3514.250	12	*MB*	28447.438	$2595°_{1\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−27	3521.123	20	*MB*	28391.912	$8804°_{4\frac{1}{2}} - 37196_{4\frac{1}{2}}$	−2
3514.321	25	*MB*	28446.863	$2382°_{4\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−14	3521.183	18	*MB*	28391.428	$7746°_{2\frac{1}{2}} - 36137_{2\frac{1}{2}}$	10
3514.489	7	*MB*	28445.504			3521.326	20	*MB*	28390.275	$5942°_{3\frac{1}{2}} - 34333_{2\frac{1}{2}}$	−24
3514.718	5	*MB*	28443.658			3521.400	5	*MB*	28389.679		
3514.926	12	*MB*	28441.967			3521.872	300	*MB*	28385.874	$4910°_{5\frac{1}{2}} - 33296_{4\frac{1}{2}}$	32
3514.966	15	*WA*	28441.643	$8402°_{3\frac{1}{2}} - 36844_{2\frac{1}{2}}$	7	3522.030	15	*MB*	28384.601	$6549°_{2\frac{1}{2}} - 34934_{2\frac{1}{2}}$	88
3515.122	7	*MB*	28440.381	$10888°_{1\frac{1}{2}} - 38529_{2\frac{1}{2}}$	0	3522.080	15	*MB*	28384.198	$1410°_{4\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−14

501-968 O - 73 - 6

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3522.262	7	*MB*	28382.731			3530.300	7	*MB*	28318.109		
3522.450	12	*MB*	28381.216	$3854_{3\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	−10	3530.631	35	*MB*	28315.455	$4322°_{2\frac{1}{2}} - 32638_{1\frac{1}{2}}$	−1
3522.608	5	*MB*	28379.944			3530.732	7	*MB*	28314.645		
3522.722	5	*MB*	28379.025			3530.946	80	*MB*	28312.929	$9491°_{0\frac{1}{2}} - 37804_{1\frac{1}{2}}$	−11
3522.771	7	*MB*	28378.630	$12097_{3\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	−18					$4737°_{2\frac{1}{2}} - 33050_{1\frac{1}{2}}$	11
3522.799	15	*MB*	28378.405	$10454°_{1\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−31	3531.165	1	*MB*	28311.173		
3522.959	10	*MB*	28377.116	$987°_{4\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−12	3531.431	7	*MB*	28309.041		
3523.101	40	*MB*	28375.972	$10703_{4\frac{1}{2}} - 39079°_{5\frac{1}{2}}$	−20	3531.590	60b	*MB*	28307.766	$12365°_{4\frac{1}{2}} - 40673_{5\frac{1}{2}}$	−2
3523.332	1	*MB*	28374.112	$5437°_{3\frac{1}{2}} - 33811_{4\frac{1}{2}}$	−32	3531.867	7	*MB*	28305.546	$4201°_{1\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−2
3523.605	20	*MB*	28371.914	$1873°_{3\frac{1}{2}} - 30245_{4\frac{1}{2}}$	−29	3531.975	2	*MB*	28304.680		
3523.733	25	*MB*	28370.883	$6549°_{2\frac{1}{2}} - 34920_{3\frac{1}{2}}$	3	3532.086	5	*MB*	28303.791	$18393_{3\frac{1}{2}} - 46697°_{4\frac{1}{2}}$	34
				$5437°_{3\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−11	3532.265	2	*MB*	28302.357		
3524.008	40	*MB*	28368.669	$5675°_{4\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−8	3532.388	20	*MB*	28301.371	$5675°_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−5
3524.073	80	*WA*	28368.146	$5964°_{3\frac{1}{2}} - 34333_{2\frac{1}{2}}$	−55	3532.602	80	*MB*	28299.657	$7259°_{3\frac{1}{2}} - 35558_{3\frac{1}{2}}$	30
3524.358	12	*MB*	28365.852	$7746°_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	16	3532.649	7	*MB*	28299.280		
				$2595°_{1\frac{1}{2}} - 30961_{1\frac{1}{2}}$	−21						
						3532.700	5	*MB*	28298.872		
3524.532	2	*MB*	28364.452			3532.871	80	*MB*	28297.502	$0°_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	29
3524.700	1	*MB*	28363.100			3532.914	5	*MB*	28297.158		
3525.003	12	*MB*	28360.662			3533.012	2	*MB*	28296.373	$10641°_{2\frac{1}{2}} - 38937_{1\frac{1}{2}}$	0
3525.133	7	*MB*	28359.616			3533.086	5	*MB*	28295.780		
3525.215	2	*MB*	28358.956			3533.113	20	*MB*	28295.564	$6517°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−18
3525.326	20	*MB*	28358.063			3533.318	7	*MB*	28293.922		
3525.454	5	*MB*	28357.034			3533.377	12	*MB*	28293.450	$17571_{4\frac{1}{2}} - 45864°_{5\frac{1}{2}}$	−98
3525.560	10	*MB*	28356.181	$7202°_{2\frac{1}{2}} - 35558_{3\frac{1}{2}}$	9	3533.548	18	*MB*	28292.081	$1873°_{3\frac{1}{2}} - 30166_{3\frac{1}{2}}$	−41
3525.626	2	*MB*	28355.650			3533.576	50	*MB*	28291.856	$6521°_{1\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−13
3525.929	20	*MB*	28353.214	$19136°_{2\frac{1}{2}} - 47489_{3\frac{1}{2}}$	−41	3533.672	15	*MB*	28291.088	$5283°_{0\frac{1}{2}} - 33574_{1\frac{1}{2}}$	−27
3525.999	18	*MB*	28352.651	$5942°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	0					$5118°_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−2
3526.140	7	*MB*	28351.517	$4511°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	7	3533.718	12	*MB*	28290.720	$6638°_{4\frac{1}{2}} - 34928_{4\frac{1}{2}}$	9
3526.685	190	*WA*	28347.136	$12326°_{6\frac{1}{2}} - 40673_{5\frac{1}{2}}$	−21	3534.043	550	*MB*	28288.118	$4203°_{6\frac{1}{2}} - 32492_{5\frac{1}{2}}$	14
3527.104	15	*MB*	28343.769	$3593°_{4\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−1	3534.152	15	*MB*	28287.246	$7059°_{4\frac{1}{2}} - 35346_{3\frac{1}{2}}$	36
3527.150	2	*MB*	28343.399			3534.437	140	*MB*	28284.965	$7522°_{5\frac{1}{2}} - 35807_{4\frac{1}{2}}$	19
3527.254	7	*MB*	28342.563			3534.741	25	*MB*	28282.532	$6638°_{4\frac{1}{2}} - 34920_{3\frac{1}{2}}$	2
3527.309	10	*MB*	28342.121	$4737°_{2\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−17	3535.046	30	*WA*	28280.092	$11759_{5\frac{1}{2}} - 40039°_{6\frac{1}{2}}$	35
3527.606	40	*MB*	28339.735	$4523°_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	1	3535.566	80	*WA*	28275.933	$2879°_{5\frac{1}{2}} - 31155_{6\frac{1}{2}}$	5
3527.841	110	*MB*	28337.848	$10114°_{2\frac{1}{2}} - 38452_{1\frac{1}{2}}$	−18	3535.688	12	*MB*	28274.957	$13758°_{1\frac{1}{2}} - 42033_{2\frac{1}{2}}$	−27
				$0°_{3\frac{1}{2}} - 28337_{2\frac{1}{2}}$	34						
						3535.757	15	*MB*	28274.405		
3528.044	60	*MB*	28336.217	$5819°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	19	3535.967	7	*MB*	28272.726		
3528.229	2	*MB*	28334.731	$0°_{3\frac{1}{2}} - 28334_{4\frac{1}{2}}$	−24	3536.175	3	*MB*	28271.063		
3528.353	5	*MB*	28333.736			3536.425	10	*MB*	28269.065		
3528.633	40b	*MB*	28331.487	$12751°_{5\frac{1}{2}} - 41083_{4\frac{1}{2}}$	−24	3536.479	20	*PK*	28268.633	$8927°_{5\frac{1}{2}} - 37196_{4\frac{1}{2}}$	8
3528.747	12	*MB*	28330.572	$5964°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	18	3536.610	5	*MB*	28267.586		
3529.038	40	*MB*	28328.236	$5716°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	11	3536.696	100	*WA*	28266.899	$10274°_{3\frac{1}{2}} - 38541_{4\frac{1}{2}}$	−2
3529.179	20	*MB*	28327.104	$20940_{3\frac{1}{2}} - 49267°_{4\frac{1}{2}}$	−38	3536.844	2	*MB*	28265.716		
3529.260	30	*MB*	28326.454	$5969°_{5\frac{1}{2}} - 34295_{4\frac{1}{2}}$	11	3537.146	60	*MB*	28263.303	$6549°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	9
3529.536	12	*MB*	28324.239	$7878°_{3\frac{1}{2}} - 36202_{4\frac{1}{2}}$	10	3537.237	5	*MB*	28262.576		
3529.731	20	*MB*	28322.674	$3995°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−40	3537.438	100b	*WA*	28260.970	$5716°_{3\frac{1}{2}} - 33977_{3\frac{1}{2}}$	46
3529.841	2	*MB*	28321.792			3537.653	5	*MB*	28259.252	$7878°_{3\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−23
3529.889	5	*MB*	28321.407			3537.961	2	*WA*	28256.792	$4459°_{3\frac{1}{2}} - 32716_{2\frac{1}{2}}$	17
3530.016	150	*MB*	28320.388	$2382°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	24	3538.222	4	*WA*	28254.708	$7202°_{2\frac{1}{2}} - 35457_{1\frac{1}{2}}$	−80
3530.132	25	*MB*	28319.457	$7818°_{1\frac{1}{2}} - 36137_{2\frac{1}{2}}$	0	3538.304	15	*WA*	28254.053	$10274°_{3\frac{1}{2}} - 38529_{2\frac{1}{2}}$	3

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3538.347	5	*MB*	28253.710			3547.137	2	*MB*	28183.697		
3538.759	30	*WA*	28250.420	$9723°_{4\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−20	3547.203	15	*MB*	28183.173		
3538.804	25	*MB*	28250.061	$6517°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	−10	3547.383	10	*MB*	28181.743		
3538.960	3	*MT*	28248.816	$13784°_{1\frac{1}{2}} - 42033_{2\frac{1}{2}}$	−4	3547.433	10	*MB*	28181.346	$10088°_{1\frac{1}{2}} - 38269_{0\frac{1}{2}}$	12
3539.076	700	*MB*	28247.890	$2581°_{4\frac{1}{2}} - 30829_{3\frac{1}{2}}$	23	3547.669	10	*MB*	28179.471	$7746°_{2\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−25
3539.270	10	*MB*	28246.342	$6521°_{1\frac{1}{2}} - 34767_{1\frac{1}{2}}$	−16	3547.731	12	*MB*	28178.979	$987°_{4\frac{1}{2}} - 29166_{4\frac{1}{2}}$	−6
3539.373	3	*MB*	28245.520			3547.805	25	*MB*	28178.391	$7278°_{1\frac{1}{2}} - 35457_{1\frac{1}{2}}$	−4
3539.678	1	*MB*	28243.086			3547.867	20	*MB*	28177.899		
3539.835	20	*MB*	28241.833	$5924°_{1\frac{1}{2}} - 34166_{1\frac{1}{2}}$	−1	3548.066	3	*MB*	28176.318		
3540.188	2	*MB*	28239.017			3548.215	12	*MB*	28175.135		
3540.551	5	*MB*	28236.122			3548.273	5	*MB*	28174.674		
3540.587	7	*MB*	28235.835	$8280°_{2\frac{1}{2}} - 36516_{1\frac{1}{2}}$	−16	3548.515	12	*MB*	28172.753		
3540.661	7	*MB*	28235.245			3548.610	12	*MB*	28171.999		
3540.805	5	*WA*	28234.097	$3703°_{3\frac{1}{2}} - 31937_{3\frac{1}{2}}$	38	3548.798	12	*MB*	28170.507		
3540.853	15	*MB*	28233.714	$7878°_{3\frac{1}{2}} - 36112_{3\frac{1}{2}}$	21	3548.830	60	*MB*	28170.252	$9634°_{1\frac{1}{2}} - 37804_{1\frac{1}{2}}$	5
3541.205	18	*MB*	28230.907	$19920°_{3\frac{1}{2}} - 48151_{4\frac{1}{2}}$	−18	3549.108	25	*MB*	28168.046	$10641°_{2\frac{1}{2}} - 38809_{3\frac{1}{2}}$	12
3541.491	20	*MB*	28228.628			3549.327	20	*MB*	28166.308		
3541.533	7	*MB*	28228.293			3550.107	5	*MB*	28160.120	$5651°_{5\frac{1}{2}} - 33811_{4\frac{1}{2}}$	−89
3541.624	2	*MB*	28227.568			3550.236	25	*MB*	28159.096		
3541.653	40	*MB*	28227.337	$3703°_{3\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−4	3550.370	18	*MB*	28158.034	$5819°_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	7
3541.907	25	*MB*	28225.312	$5819°_{4\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−15	3550.432	5	*MB*	28157.542		
3542.268	25	*MB*	28222.436			3550.535	12	*MB*	28156.725		
3542.750	5	*MB*	28218.596			3550.700	2	*MB*	28155.417		
3542.853	7	*MB*	28217.776	$6549°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	−6	3550.755	3	*MB*	28154.981	$16268_{1\frac{1}{2}} - 44423°_{1\frac{1}{2}}$	79
3542.997	10	*MB*	28216.629			3550.929	1	*MB*	28153.601		
3543.282	80	*MB*	28214.360	$9634°_{1\frac{1}{2}} - 37848_{2\frac{1}{2}}$	−3	3551.347	3	*MB*	28150.287		
3543.512	40	*MB*	28212.528	$5942°_{3\frac{1}{2}} - 34155_{3\frac{1}{2}}$	16	3551.427	80	*MB*	28149.653	$2595°_{1\frac{1}{2}} - 30745_{1\frac{1}{2}}$	12
3543.678	25	*MB*	28211.207	$17232_{7\frac{1}{2}} - 45443°_{7\frac{1}{2}}$	0	3551.662	100b	*MB*	28147.791	$3703°_{3\frac{1}{2}} - 31851_{2\frac{1}{2}}$	−11
3543.825	10	*MB*	28210.037	$2879°_{5\frac{1}{2}} - 31089_{5\frac{1}{2}}$	1	3551.769	20	*MB*	28146.943	$4266°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−5
3544.200	12	*MB*	28207.052	$4165_{4\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	−18	3551.907	10	*MB*	28145.849		
3544.375	12	*MB*	28205.659	$4844°_{1\frac{1}{2}} - 33050_{1\frac{1}{2}}$	13	3552.064	50b	*MB*	28144.606	$3593°_{4\frac{1}{2}} - 31738_{5\frac{1}{2}}$	4
3544.408	7	*MB*	28205.397	$4511°_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	7	3552.135	10	*MB*	28144.043	$9198°_{3\frac{1}{2}} - 37342_{2\frac{1}{2}}$	42
3544.581	10	*MB*	28204.020			3552.239	17	*MB*	28143.219	$3995°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−18
3544.770	25	*MB*	28202.516	$3995°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−5	3552.475	1	*MB*	28141.349		
3544.876	1	*MB*	28201.673			3552.722	220	*MB*	28139.393	$2563°_{5\frac{1}{2}} - 30702_{4\frac{1}{2}}$	16
3544.974	2	*MB*	28200.894			3552.929	25	*WA*	28137.753	$5010°_{2\frac{1}{2}} - 33148_{2\frac{1}{2}}$	35
3545.031	12	*MB*	28200.440	$4844°_{1\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−10	3553.151	12	*MB*	28135.996	$7061°_{0\frac{1}{2}} - 35197_{1\frac{1}{2}}$	−5
3545.601	190	*MB*	28195.907	$2879°_{5\frac{1}{2}} - 31075_{4\frac{1}{2}}$	0	3553.352	1	*MB*	28134.404		
3545.695	12	*MB*	28195.159	$3363°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−39	3553.466	3	*MB*	28133.501		
3545.748	40	*MB*	28194.738	$9778°_{2\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−51	3553.498	2	*MB*	28133.248		
3545.783	60	*MB*	28194.459	$2634°_{2\frac{1}{2}} - 30829_{3\frac{1}{2}}$	2	3553.847	1	*MB*	28130.485	$17000_{3\frac{1}{2}} - 45130°_{2\frac{1}{2}}$	−36
3545.910	50	*MB*	28193.450	$7522°_{5\frac{1}{2}} - 35716_{5\frac{1}{2}}$	−11	3553.951	7	*MB*	28129.662	$11742°_{5\frac{1}{2}} - 39871_{4\frac{1}{2}}$	74
3546.186	260	*MB*	28191.255	$10641°_{2\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−11	3554.126	2	*MB*	28128.277		
				$1873°_{3\frac{1}{2}} - 30065_{3\frac{1}{2}}$	26	3554.301	15	*WA*	28126.892	$4511°_{2\frac{1}{2}} - 32638_{1\frac{1}{2}}$	−15
3546.376	1	*MB*	28189.745			3554.420	2	*MB*	28125.951		
3546.517	10	*MB*	28188.624			3554.491	12	*MB*	28125.389	$4737°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−4
3546.651	90	*MB*	28187.559	$2641°_{3\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−5	3554.543	6	*MB*	28124.978		
3546.829	15	*MB*	28186.145	$13012°_{2\frac{1}{2}} - 41198_{2\frac{1}{2}}$	−68	3554.633	100	*WA*	28124.265	$9491°_{0\frac{1}{2}} - 37615_{0\frac{1}{2}}$	25
3547.006	140	*MB*	28184.738	$4322°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	4	3555.001	380	*MB*	28121.354	$2581°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	1
3547.071	2	*MB*	28184.222			3555.128	5	*MB*	28120.349		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3555.158	60	*MB*	28120.112	$1873°_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	5	3563.221	3	*MB*	28056.483		
3555.227	20	*MB*	28119.566	$8804°_{4\frac{1}{2}} - 36923_{4\frac{1}{2}}$	2	3563.820	100	*MB*	28051.767	$4266°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−10
3555.298	5	*MB*	28119.005	$8169°_{1\frac{1}{2}} - 36288_{0\frac{1}{2}}$	44	3564.377	20	*MB*	28047.384	$7878°_{3\frac{1}{2}} - 35925_{3\frac{1}{2}}$	30
3555.372	1	*MB*	28118.420			3564.443	10	*MB*	28046.864		
3555.699	5	*MB*	28115.834			3564.561	2	*MB*	28045.936		
3555.786	30	*MB*	28115.146	$5437°_{3\frac{1}{2}} - 33552_{2\frac{1}{2}}$	−13	3564.606	2	*MB*	28045.582		
3555.943	12	*MB*	28113.905			3564.722	18	*MB*	28044.669	$12466°_{1\frac{1}{2}} - 40511_{1\frac{1}{2}}$	−27
3556.098	8	*WA*	28112.679	$3854_{3\frac{1}{2}} - 31966°_{2\frac{1}{2}}$	−56	3564.893	7	*MB*	28043.324		
3556.110	30	*MB*	28112.584	$4201°_{1\frac{1}{2}} - 32314_{0\frac{1}{2}}$	9	3565.124	7	*MB*	28041.507	$2595°_{1\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−5
3556.270	2	*MB*	28111.320			3565.339	12	*MB*	28039.816		
3556.331	2	*MB*	28110.837			3565.424	30	*MB*	28039.148	$9491°_{0\frac{1}{2}} - 37530_{1\frac{1}{2}}$	8
3556.363	30	*MB*	28110.585	$2634°_{2\frac{1}{2}} - 30745_{1\frac{1}{2}}$	−34	3565.715	6	*MB*	28036.860		
3556.892	60	*MB*	28106.404	$12751°_{5\frac{1}{2}} - 40858_{4\frac{1}{2}}$	−18	3565.867	7	*MB*	28035.664		
3557.230	15	*MB*	28103.733			3566.033	12	*WA*	28034.359	$5942°_{3\frac{1}{2}} - 33977_{3\frac{1}{2}}$	18
3557.380	10	*MB*	28102.549			3566.055	10	*MB*	28034.186	$10798°_{2\frac{1}{2}} - 38832_{2\frac{1}{2}}$	33
										$5010°_{2\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−38
3557.459	10	*MB*	28101.924	$10035°_{5\frac{1}{2}} - 38137_{5\frac{1}{2}}$	−46						
3557.494	30	*MB*	28101.648	$5942°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	5	3566.111	12	*MB*	28033.746		
3557.610	7	*MB*	28100.732			3566.479	40	*WA*	28030.854	$13027_{6\frac{1}{2}} - 41058°_{7\frac{1}{2}}$	−1
3557.875	10	*MB*	28098.639	$10035°_{5\frac{1}{2}} - 38134_{4\frac{1}{2}}$	−49	3566.664	3	*MB*	28029.400		
3557.915	12	*MB*	28098.323			3566.776	20	*MB*	28028.520	$1410°_{4\frac{1}{2}} - 29438_{5\frac{1}{2}}$	7
3557.960	2	*MB*	28097.967			3566.832	10	*MB*	28028.080		
3558.107	3	*MB*	28096.807			3567.166	3	*WA*	28025.455	$9778°_{2\frac{1}{2}} - 37804_{1\frac{1}{2}}$	8
3558.204	2	*MB*	28096.041			3567.432	7	*MB*	28023.366		
3558.291	15	*MB*	28095.354	$5716°_{3\frac{1}{2}} - 33811_{4\frac{1}{2}}$	3	3567.466	7	*MB*	28023.099	$7202°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−27
3558.367	10	*MB*	28094.754	$19950_{6\frac{1}{2}} - 48045°_{6\frac{1}{2}}$	−5	3567.554	2	*MB*	28022.407		
3558.401	12	*MB*	28094.485	$7713°_{4\frac{1}{2}} - 35807_{4\frac{1}{2}}$	7	3567.735	20	*MB*	28020.986		
3558.702	35	*MB*	28092.109	$5716°_{3\frac{1}{2}} - 33808_{2\frac{1}{2}}$	8	3567.777	7	*MB*	28020.656	$3745°_{1\frac{1}{2}} - 31766_{1\frac{1}{2}}$	22
3558.822	10	*MB*	28091.162	$14481°_{2\frac{1}{2}} - 42573_{3\frac{1}{2}}$	−98	3567.824	7	*MB*	28020.287		
3558.887	20	*MB*	28090.649	$4322°_{2\frac{1}{2}} - 32413_{3\frac{1}{2}}$	11	3568.123	110	*MB*	28017.939	$9634°_{1\frac{1}{2}} - 37652_{2\frac{1}{2}}$	34
3559.024	15	*MB*	28089.568	$8804°_{4\frac{1}{2}} - 36893_{3\frac{1}{2}}$	22	3568.238	2	*MB*	28017.036		
3559.323	30	*MB*	28087.208	$7259°_{3\frac{1}{2}} - 35346_{3\frac{1}{2}}$	1	3568.405	7	*MB*	28015.725	$4844°_{1\frac{1}{2}} - 32860_{0\frac{1}{2}}$	16
3559.567	2	*MB*	28085.283			3568.929	1	*MB*	28011.612		
3559.607	7	*MB*	28084.967			3569.018	12	*MB*	28010.913	$10798°_{2\frac{1}{2}} - 38809_{3\frac{1}{2}}$	−7
3559.851	3	*MB*	28083.042			3569.311	80	*MB*	28008.614	$5651°_{5\frac{1}{2}} - 33659_{5\frac{1}{2}}$	3
3560.068	10	*MB*	28081.330			3569.482	20	*MB*	28007.272	$11387°_{3\frac{1}{2}} - 39394_{3\frac{1}{2}}$	10
3560.196	1	*MB*	28080.321			3569.688	10	*MB*	28005.656	$3363°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	−9
3560.294	12	*MB*	28079.548	$5964°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	3	3570.028	20	*WA*	28002.989	$7713°_{4\frac{1}{2}} - 35716_{5\frac{1}{2}}$	−4
3560.609	10	*MB*	28077.064			3570.088	2	*WA*	28002.518	$2634°_{2\frac{1}{2}} - 30637_{2\frac{1}{2}}$	27
3560.798	1100	*MB*	28075.574	$5455°_{7\frac{1}{2}} - 33531_{6\frac{1}{2}}$	31	3570.421	2	*MB*	27999.906		
3560.900	15	*MB*	28074.769	$10454°_{1\frac{1}{2}} - 38529_{2\frac{1}{2}}$	21	3570.539	2	*MB*	27998.981		
3561.111	10	*MB*	28073.106	$13012°_{2\frac{1}{2}} - 41085_{3\frac{1}{2}}$	−12	3570.610	1	*MB*	27998.424	$10454°_{1\frac{1}{2}} - 38452_{1\frac{1}{2}}$	−53
3561.542	40	*MB*	28069.709	$4165_{4\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	20	3570.883	12	*MB*	27996.284	$8927°_{5\frac{1}{2}} - 36923_{4\frac{1}{2}}$	9
3561.600	20	*MB*	28069.252	$11325°_{2\frac{1}{2}} - 39394_{3\frac{1}{2}}$	40	3570.983	40	*MB*	27995.500	$4322°_{2\frac{1}{2}} - 32318_{3\frac{1}{2}}$	33
3561.675	12	*MB*	28068.661	$5010°_{2\frac{1}{2}} - 33079_{3\frac{1}{2}}$	19	3571.372	20	*MB*	27992.451	$5819°_{4\frac{1}{2}} - 33811_{4\frac{1}{2}}$	−2
3562.097	80	*MB*	28065.336	$4203°_{6\frac{1}{2}} - 32269_{7\frac{1}{2}}$	18	3571.738	2	*MB*	27989.582	$13758°_{1\frac{1}{2}} - 41748_{1\frac{1}{2}}$	−26
3562.284	5	*MB*	28063.862			3571.894	1	*MB*	27988.360		
3562.641	20	*MB*	28061.050	$2641°_{3\frac{1}{2}} - 30702_{4\frac{1}{2}}$	0	3572.248	3	*MB*	27985.586		
3562.995	7	*MB*	28058.262			3572.425	110	*MB*	27984.200	$5675°_{4\frac{1}{2}} - 33659_{5\frac{1}{2}}$	−4
3563.034	12	*MB*	28057.955			3572.658	20	*MB*	27982.375		
3563.142	3	*MB*	28057.105			3572.763	25	*MB*	27981.553	$9634°_{1\frac{1}{2}} - 37615_{0\frac{1}{2}}$	5

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3573.044	25	*MB*	27979.352	$4737°_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	78	3583.100	30	*PK*	27900.830	$4737°_{2\frac{1}{2}} - 32638_{1\frac{1}{2}}$	38
3573.163	1	*MB*	27978.420			3583.347	2	*MB*	27898.907		
3573.584	20	*MB*	27975.124			3583.372	3	*MB*	27898.712		
3573.707	80	*MB*	27974.162	$3593°_{4\frac{1}{2}} - 31568_{4\frac{1}{2}}$	25	3583.661	80	*MB*	27896.462	$9634°_{1\frac{1}{2}} - 37530_{1\frac{1}{2}}$	16
3573.928	10	*MB*	27972.432	$5437°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−42	3583.726	15	*MB*	27895.956		
3574.174	6	*MB*	27970.506			3583.834	12	*MB*	27895.116	$15565°_{2\frac{1}{2}} - 43460_{2\frac{1}{2}}$	3
3574.199	7	*MB*	27970.311			3583.897	5	*MB*	27894.626		
3574.366	7	*MB*	27969.004	$16454_{2\frac{1}{2}} - 44423°_{1\frac{1}{2}}$	−15	3583.956	3	*MB*	27894.166	$5283°_{0\frac{1}{2}} - 33177_{0\frac{1}{2}}$	0
				$4523°_{4\frac{1}{2}} - 32492_{5\frac{1}{2}}$	0	3583.977	20	*MB*	27894.003	$6967_{6\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	24
3574.507	10	*MB*	27967.901	$8169°_{1\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−4	3584.140	2	*MB*	27892.734		
3574.672	20	*WA*	27966.610	$7259°_{3\frac{1}{2}} - 35225_{2\frac{1}{2}}$	29	3584.336	100	*MB*	27891.209	$4910°_{5\frac{1}{2}} - 32802_{5\frac{1}{2}}$	7
3574.911	25	*MB*	27964.740	$3593°_{4\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−3	3584.447	20	*WA*	27890.345	$4523°_{4\frac{1}{2}} - 32413_{3\frac{1}{2}}$	33
3575.001	3	*MB*	27964.036			3584.587	18	*MB*	27889.256	$11949°_{3\frac{1}{2}} - 39838_{2\frac{1}{2}}$	0
3575.073	30	*WA*	27963.473	$13784°_{1\frac{1}{2}} - 41748_{1\frac{1}{2}}$	28	3584.802	30	*MB*	27887.584	$10641°_{2\frac{1}{2}} - 38529_{2\frac{1}{2}}$	5
3575.182	20	*MB*	27962.621	$9269°_{0\frac{1}{2}} - 37232_{1\frac{1}{2}}$	9	3585.198	18	*MB*	27884.503	$10924°_{4\frac{1}{2}} - 38809_{3\frac{1}{2}}$	−96
3575.295	40	*MB*	27961.737	$8175°_{2\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−3	3585.395	7	*MB*	27882.971	$13217_{3\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	15
3576.228	190	*MB*	27954.442	$1410°_{4\frac{1}{2}} - 29364_{3\frac{1}{2}}$	6	3585.471	1	*MB*	27882.380		
3576.519	7	*MB*	27952.168	$5924°_{1\frac{1}{2}} - 33876_{1\frac{1}{2}}$	−4	3585.540	3	*MB*	27881.844		
3576.720	7	*MB*	27950.597			3585.698	7	*MB*	27880.615	$10314_{4\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	49
3576.918	7	*MB*	27949.050	$17000_{3\frac{1}{2}} - 44949°_{4\frac{1}{2}}$	46	3585.779	7	*MB*	27879.985	$5651°_{5\frac{1}{2}} - 33531_{6\frac{1}{2}}$	−45
3577.197	25	*MB*	27946.870	$19483_{2\frac{1}{2}} - 47430°_{3\frac{1}{2}}$	−88	3586.172	10	*MB*	27876.930		
3577.450	950	*MB*	27944.894	$3793°_{6\frac{1}{2}} - 31738_{5\frac{1}{2}}$	44	3586.279	7	*MB*	27876.098	$6549°_{2\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−30
3577.798	2	*WA*	27942.176	$3995°_{3\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−16	3586.334	7	*MB*	27875.671		
3578.201	10	*MB*	27939.029			3586.557	7	*MB*	27873.938		
3578.296	7	*MB*	27938.287			3586.770	80	*MB*	27872.282	$4266°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−18
3578.488	7	*MB*	27936.788	$4201°_{1\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−16	3586.806	10	*MB*	27872.003	$4844°_{1\frac{1}{2}} - 32716_{2\frac{1}{2}}$	0
3578.527	3	*MB*	27936.483			3586.877	12	*MB*	27871.451	$3363°_{2\frac{1}{2}} - 31234_{2\frac{1}{2}}$	0
3578.570	7	*MB*	27936.148	$817ɔ°_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−9	3587.078	20	*MB*	27869.889	$7059°_{4\frac{1}{2}} - 34928_{4\frac{1}{2}}$	−7
3578.661	18	*MB*	27935.437	$3995°_{3\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−38	3587.221	40	*MB*	27868.778	$5942°_{3\frac{1}{2}} - 33811_{4\frac{1}{2}}$	10
3578.738	40	*MB*	27934.836	$10035°_{5\frac{1}{2}} - 37970_{5\frac{1}{2}}$	16	3587.259	1	*MB*	27868.483		
				$7522°_{0\frac{1}{2}} - 35457_{1\frac{1}{2}}$	−23						
						3587.456	25	*MB*	27866.953		
3578.810	20	*MB*	27934.275			3587.640	150	*MB*	27865.524	$5942°_{3\frac{1}{2}} - 33808_{2\frac{1}{2}}$	5
3578.951	20	*MB*	27933.174	$1873°_{3\frac{1}{2}} - 29807_{3\frac{1}{2}}$	30	3587.685	30	*MB*	27865.174	$9723°_{4\frac{1}{2}} - 37588_{3\frac{1}{2}}$	37
3579.157	15	*MB*	27931.566	$4266°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−18	3587.780	7	*MB*	27864.436	$3703°_{3\frac{1}{2}} - 31568_{4\frac{1}{2}}$	12
3579.193	10	*MB*	27931.285			3587.862	5	*MB*	27863.800		
3579.452	10	*MB*	27929.264	$7878°_{3\frac{1}{2}} - 35807_{4\frac{1}{2}}$	25	3587.884	5	*MB*	27863.629	$2382°_{4\frac{1}{2}} - 30245_{4\frac{1}{2}}$	−2
3579.782	3	*MB*	27926.690			3588.128	80	*MB*	27861.734	$7059°_{4\frac{1}{2}} - 34920_{3\frac{1}{2}}$	18
3579.836	10	*MB*	27926.269	$5118°_{2\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−19	3588.425	150	*MB*	27859.428	$10274°_{3\frac{1}{2}} - 38134_{4\frac{1}{2}}$	0
3580.300	10	*MB*	27922.649	$11949°_{3\frac{1}{2}} - 39871_{4\frac{1}{2}}$	6	3588.495	50	*MB*	27858.885	$10114°_{2\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−7
3580.355	7	*MB*	27922.221			3588.569	15	*MB*	27858.310	$4459°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	7
3580.438	3	*MB*	27921.573			3588.780	10	*MB*	27856.672	$8280°_{2\frac{1}{2}} - 36137_{2\frac{1}{2}}$	15
3580.565	80	*MB*	27920.583	$1873°_{3\frac{1}{2}} - 29794_{3\frac{1}{2}}$	0	3588.841	10	*MB*	27856.199		
3580.776	50	*PK*	27918.938	$7278°_{1\frac{1}{2}} - 35197_{1\frac{1}{2}}$	20	3588.985	15	*MB*	27855.081	$3703°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	49
3581.398	5	*MB*	27914.089			3589.065	10	*MB*	27854.460		
3581.800	20	*MB*	27910.956	$12762°_{4\frac{1}{2}} - 40673_{5\frac{1}{2}}$	22	3589.166	1	*MB*	27853.676		
3582.124	20	*WA*	27908.432	$6517°_{2\frac{1}{2}} - 34426_{2\frac{1}{2}}$	14	3589.240	1	*MB*	27853.102		
3582.202	10	*MB*	27907.824			3589.393	20	*MB*	27851.915	$5010°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	18
3582.499	15	*WA*	27905.510	$6389°_{4\frac{1}{2}} - 34295_{4\frac{1}{2}}$	3	3589.681	3	*MB*	27849.681	$7011_{4\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	−40
3582.602	30	*MB*	27904.708	$6521°_{1\frac{1}{2}} - 34426_{2\frac{1}{2}}$	3	3589.828	1	*MB*	27848.540		
3582.940	15	*MB*	27902.076	$4511°_{2\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−12	3589.858	5	*MB*	27848.307		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3590.036	5	*MB*	27846.927			3597.035	2	*MB*	27792.745		
3590.153	7	*MB*	27846.019			3597.318	1	*MB*	27790.558		
3590.206	6	*MB*	27845.608	$7713°_{4\frac{1}{2}} - 35558_{3\frac{1}{2}}$	−4	3597.355	10	*MB*	27790.272		
3590.348	30	*MB*	27844.507	$3363°_{2\frac{1}{2}} - 31207_{3\frac{1}{2}}$	7	3597.543	3	*MB*	27788.820		
3590.487	15	*MB*	27843.429	$5964°_{3\frac{1}{2}} - 33808_{2\frac{1}{2}}$	8	3597.640	3	*MB*	27788.071		
3590.598	300	*MT*	27842.568	$5969°_{5\frac{1}{2}} - 33811_{4\frac{1}{2}}$	8	3598.191	140	*MB*	27783.816	$2382°_{4\frac{1}{2}} - 30166_{3\frac{1}{2}}$	5
3590.798	10	*MB*	27841.018	$10820_{2\frac{1}{2}} - 38661°_{1\frac{1}{2}}$	−15					$2641°_{3\frac{1}{2}} - 30425_{2\frac{1}{2}}$	26
3591.129	1	*MB*	27838.451			3598.276	12	*MB*	27783.159	$6549°_{2\frac{1}{2}} - 34333_{2\frac{1}{2}}$	−30
3591.240	3	*MB*	27837.591			3598.478	5	*MB*	27781.600		
3591.336	6	*MB*	27836.847			3598.517	5	*MB*	27781.299	$12057°_{2\frac{1}{2}} - 39838_{2\frac{1}{2}}$	−38
3591.400	5	*MB*	27836.351	$5716°_{3\frac{1}{2}} - 33552_{2\frac{1}{2}}$	−14	3598.635	18	*MB*	27780.388		
3591.467	6	*MB*	27835.832			3598.733	2	*MB*	27779.631		
3591.581	10	*MB*	27834.948			3598.839	7	*MB*	27778.813		
3591.738	7	*MB*	27833.731			3599.153	2	*MB*	27776.390		
3591.818	7	*MB*	27833.111			3599.496	3	*MB*	27773.743		
3592.068	12	*MB*	27831.174	$8280°_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	100	3599.726	2	*MB*	27771.968		
3592.309	1	*MB*	27829.307			3599.972	80	*MB*	27770.071	$4737°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	2
3592.456	1	*MB*	27828.168			3600.074	15	*MB*	27769.284	$7092_{5\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	23
3592.492	3	*MB*	27827.890			3600.109	12	*MB*	27769.014		
3592.571	3	*MB*	27827.278			3600.201	6	*MB*	27768.304	$10684°_{0\frac{1}{2}} - 38452_{1\frac{1}{2}}$	−4
3592.755	5	*MB*	27825.853			3600.335	12	*MB*	27767.271	$5283°_{0\frac{1}{2}} - 33050_{1\frac{1}{2}}$	9
3592.883	1	*MB*	27824.861	$11007°_{1\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−48	3600.580	150	*MB*	27765.381	$6389°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	13
3593.134	20	*MB*	27822.918	$2879°_{5\frac{1}{2}} - 30702_{4\frac{1}{2}}$	3	3600.755	10	*MB*	27764.032		
3593.227	18	*MB*	27822.198			3601.289	18	*MB*	27759.915	$10088°_{1\frac{1}{2}} - 37848_{2\frac{1}{2}}$	6
3593.314	1	*MB*	27821.524			3601.504	7	*MB*	27758.258		
3593.492	20	*MB*	27820.146	$11015_{3\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	−8	3601.662	6	*MB*	27757.040		
3593.644	7	*MB*	27818.969			3601.760	20	*MB*	27756.285	$1410°_{4\frac{1}{2}} - 29166_{4\frac{1}{2}}$	−7
3593.726	1	*MB*	27818.335			3601.865	20	*MB*	27755.476		
3594.032	30	*MB*	27815.966	$4322°_{2\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−23	3602.014	20	*MB*	27754.328		
3594.092	30	*MB*	27815.502	$6517°_{2\frac{1}{2}} - 34333_{2\frac{1}{2}}$	23	3602.234	5	*MB*	27752.633	$2382°_{4\frac{1}{2}} - 30134_{5\frac{1}{2}}$	−30
3594.230	3	*MB*	27814.434	$8702°_{1\frac{1}{2}} - 36516_{1\frac{1}{2}}$	80	3602.445	10	*MB*	27751.008		
3594.382	15	*MB*	27813.258			3603.320	7	*MB*	27744.269		
3594.494	20	*MB*	27812.391	$0°_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−6	3603.359	60	*MB*	27743.969	$5118°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	8
3594.574	20	*MB*	27811.772	$6521°_{1\frac{1}{2}} - 34333_{2\frac{1}{2}}$	6	3603.472	20	*MB*	27743.099	$987°_{4\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−1
3594.612	20	*MB*	27811.478	$0°_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−17	3603.749	12	*MB*	27740.966	$9491°_{0\frac{1}{2}} - 37232_{1\frac{1}{2}}$	21
3594.635	20	*MB*	27811.300	$10641°_{2\frac{1}{2}} - 38452_{1\frac{1}{2}}$	−7	3603.871	7	*MB*	27740.027		
3594.763	6	*MB*	27810.310			3604.058	2	*MB*	27738.588		
3594.925	1	*MB*	27809.057	$9269°_{0\frac{1}{2}} - 37078_{1\frac{1}{2}}$	4	3604.122	35	*MB*	27738.095	$4459°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−14
3595.172	5	*MB*	27807.146	$3363°_{2\frac{1}{2}} - 31170_{1\frac{1}{2}}$	−71	3604.192	140	*MB*	27737.557	$987°_{4\frac{1}{2}} - 28725_{4\frac{1}{2}}$	20
3595.204	10	*MB*	27806.899	$4511°_{2\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−18	3604.267	15	*MB*	27736.980		
3595.414	2	*MB*	27805.275			3604.466	15	*MB*	27735.448		
3595.480	1	*MB*	27804.764			3604.534	18	*MB*	27734.925	$8402°_{3\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−10
3595.547	3	*MB*	27804.246	$13784°_{1\frac{1}{2}} - 41589_{0\frac{1}{2}}$	−54	3604.567	10	*MB*	27734.671		
3596.110	100	*MB*	27799.893	$8402°_{3\frac{1}{2}} - 36202_{4\frac{1}{2}}$	4	3604.638	15	*MB*	27734.125	$5675°_{4\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−8
3596.384	12	*MB*	27797.775			3604.695	20	*MB*	27733.686	$10114°_{2\frac{1}{2}} - 37848_{2\frac{1}{2}}$	20
3596.577	2	*MB*	27796.284			3604.932	20	*WA*	27731.863	$7202°_{2\frac{1}{2}} - 34934_{2\frac{1}{2}}$	−30
3596.632	3	*MB*	27795.858			3605.113	18	*MB*	27730.471	$10798°_{2\frac{1}{2}} - 38529_{2\frac{1}{2}}$	5
3596.727	40	*MB*	27795.124	$4523°_{4\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−17	3605.348	5	*MB*	27728.663		
3596.853	1	*MB*	27794.151			3605.495	1	*MB*	27727.533		
3596.967	1	*MB*	27793.270			3605.606	2	*MB*	27726.679		

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm⁻¹	Classification	O–C 0.001 cm⁻¹	Wavelength Å	Intensity	Ref.	Wavenumber cm⁻¹	Classification	O–C 0.001 cm⁻¹
3605.770	25	WA	27725.418	$9198°_{3\frac{1}{2}}-36923_{4\frac{1}{2}}$	−44	3614.893	1	MB	27655.449	$7278°_{1\frac{1}{2}}-34934_{2\frac{1}{2}}$	−51
3605.847	3	MB	27724.826			3614.979	7	MB	27654.791		
3606.271	3	MB	27721.567			3615.020	6	MB	27654.477	$6389°_{4\frac{1}{2}}-34044_{4\frac{1}{2}}$	−21
3606.302	18	MB	27721.328			3615.061	7	MB	27654.164	$10798°_{2\frac{1}{2}}-38452_{1\frac{1}{2}}$	−30
3606.368	3	MB	27720.821			3615.209	3	MB	27653.031		
3606.488	6	MB	27719.899			3615.343	1	MB	27652.007		
3606.906	7	MB	27716.686			3615.449	1	MB	27651.196		
3606.985	6	MB	27716.079			3615.632	50	MB	27649.796	$2140°_{0\frac{1}{2}}-29790_{0\frac{1}{2}}$	19
3607.024	2	MB	27715.780	$10088°_{1\frac{1}{2}}-37804_{1\frac{1}{2}}$	−13	3615.821	3	MB	27648.351	$6517°_{2\frac{1}{2}}-34166_{1\frac{1}{2}}$	−68
3607.620	360	MB	27711.201	$5437°_{3\frac{1}{2}}-33148_{2\frac{1}{2}}$	34	3616.128	25	MB	27646.004	$9198°_{3\frac{1}{2}}-36844_{2\frac{1}{2}}$	25
3607.856	30	MB	27709.388	$8402°_{3\frac{1}{2}}-36112_{3\frac{1}{2}}$	35	3616.199	110	MB	27645.461	$5651°_{5\frac{1}{2}}-33296_{4\frac{1}{2}}$	13
3608.013	12	MB	27708.183	$9634°_{1\frac{1}{2}}-37342_{2\frac{1}{2}}$	42	3616.295	25	MB	27644.727	$8280°_{2\frac{1}{2}}-35925_{3\frac{1}{2}}$	−8
3608.321	7	MB	27705.817	$7061°_{0\frac{1}{2}}-34767_{1\frac{1}{2}}$	−35					$6521°_{1\frac{1}{2}}-34166_{1\frac{1}{2}}$	21
				$5010°_{2\frac{1}{2}}-32716_{2\frac{1}{2}}$	41	3616.514	5	MB	27643.053		
3608.915	1	MB	27701.257			3616.638	10	MB	27642.106	$5437°_{3\frac{1}{2}}-33079_{3\frac{1}{2}}$	16
3608.942	3	MB	27701.050			3616.862	7	MB	27640.394		
3609.070	1	MB	27700.068			3617.024	5	MB	27639.156	$7818°_{1\frac{1}{2}}-35457_{1\frac{1}{2}}$	−14
3609.213	25	MB	27698.970			3617.103	12	MB	27638.552	$6521°_{1\frac{1}{2}}-34159_{0\frac{1}{2}}$	7
3609.277	5	MB	27698.479			3617.187	1	MB	27637.910		
3609.679	500	MB	27695.395	$7233°_{5\frac{1}{2}}-34928_{4\frac{1}{2}}$	53	3617.213	3	MB	27637.712	$6517°_{2\frac{1}{2}}-34155_{3\frac{1}{2}}$	20
				$9198°_{3\frac{1}{2}}-36893_{3\frac{1}{2}}$	−48						
						3617.310	1	MB	27636.971		
3609.898	20	MB	27693.714	$5716°_{3\frac{1}{2}}-33409_{3\frac{1}{2}}$	34	3617.388	5	MB	27636.375		
3610.254	25	MB	27690.984	$5969°_{5\frac{1}{2}}-33659_{5\frac{1}{2}}$	23	3617.821	10	MB	27633.067		
3610.437	25	MB	27689.580	$10114°_{2\frac{1}{2}}-37804_{1\frac{1}{2}}$	29	3618.140	10	MB	27630.631	$13659°_{4\frac{1}{2}}-41289_{5\frac{1}{2}}$	−10
3610.735	3	MB	27687.295			3618.432	25	MB	27628.401	$5924°_{1\frac{1}{2}}-33552_{2\frac{1}{2}}$	23
3610.759	2	MB	27687.111			3618.571	150	MB	27627.340	$5010°_{2\frac{1}{2}}-32638_{1\frac{1}{2}}$	45
3610.908	110	MB	27685.968	$7341_{5\frac{1}{2}}-35026°_{4\frac{1}{2}}$	32	3618.950	35	MB	27624.447		
3611.145	2	MB	27684.151			3619.078	12	MB	27623.470		
3611.304	40	MB	27682.933	$2382°_{4\frac{1}{2}}-30065_{3\frac{1}{2}}$	15	3619.248	6	MB	27622.172		
3611.337	70	MB	27682.680	$2563°_{5\frac{1}{2}}-30245_{4\frac{1}{2}}$	35	3619.395	10	MB	27621.050	$5675°_{4\frac{1}{2}}-33296_{4\frac{1}{2}}$	9
3611.604	5	MB	27680.633			3619.662	15	MB	27619.013		
3611.642	15	WA	27680.342	$7878°_{3\frac{1}{2}}-35558_{3\frac{1}{2}}$	−31	3619.812	5	MB	27617.868		
3611.723	25	MB	27679.721	$3363°_{2\frac{1}{2}}-31043_{2\frac{1}{2}}$	38	3619.887	7	MB	27617.296		
3612.038	10	MB	27677.307			3619.924	8	MT	27617.014	$10924°_{4\frac{1}{2}}-38541_{4\frac{1}{2}}$	17
3612.081	1	MB	27676.978			3619.944	60	MB	27616.862	$2563°_{5\frac{1}{2}}-30180_{6\frac{1}{2}}$	0
3612.216	3	MB	27675.944	$4737°_{2\frac{1}{2}}-32413_{3\frac{1}{2}}$	−28	3620.041	18	MB	27616.121	$6549°_{2\frac{1}{2}}-34166_{1\frac{1}{2}}$	−9
3612.290	20	MB	27675.377	$7522°_{0\frac{1}{2}}-35197_{1\frac{1}{2}}$	−4	3620.124	25	MB	27615.488		
				$7259°_{3\frac{1}{2}}-34934_{2\frac{1}{2}}$	29	3620.315	35	MB	27614.031	$3593°_{4\frac{1}{2}}-31207_{3\frac{1}{2}}$	−13
3612.341	80	MB	27674.986	$4523°_{4\frac{1}{2}}-32197_{4\frac{1}{2}}$	37	3620.485	1	MB	27612.735		
3612.825	18	MB	27671.278	$4266°_{3\frac{1}{2}}-31937_{3\frac{1}{2}}$	23	3620.586	5	MB	27611.965	$11325°_{2\frac{1}{2}}-38937_{1\frac{1}{2}}$	−69
3613.005	3	MB	27669.900	$7259°_{3\frac{1}{2}}-34928_{4\frac{1}{2}}$	6	3620.612	5	MB	27611.766	$12260°_{3\frac{1}{2}}-39871_{4\frac{1}{2}}$	22
3613.484	3	MB	27666.232			3620.695	1	MB	27611.133		
3613.693	380	MB	27664.632	$2581°_{4\frac{1}{2}}-30245_{4\frac{1}{2}}$	11	3620.749	1	MB	27610.721	$7202°_{2\frac{1}{2}}-34813_{2\frac{1}{2}}$	49
3613.857	5	MB	27663.377			3620.962	7	MB	27609.097	$20940_{3\frac{1}{2}}-48549°_{4\frac{1}{2}}$	−53
3614.013	30	MB	27662.183	$3508°_{0\frac{1}{2}}-31170_{1\frac{1}{2}}$	8	3621.149	40	MB	27607.672	$5437°_{3\frac{1}{2}}-33045_{2\frac{1}{2}}$	0
3614.123	10	MB	27661.341			3621.250	5	MB	27606.902		
3614.354	10	MB	27659.573			3621.322	2	MB	27606.353		
3614.440	2	MB	27658.915			3621.449	5	MB	27605.385	$6549°_{2\frac{1}{2}}-34155_{3\frac{1}{2}}$	−17
3614.613	1	MB	27657.591			3621.561	7	MB	27604.531		
3614.666	3	MB	27657.185	$6638°_{4\frac{1}{2}}-34295_{4\frac{1}{2}}$	−6	3621.587	10	MB	27604.333	$2641°_{3\frac{1}{2}}-30245_{4\frac{1}{2}}$	14

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3621.712	10	*MB*	27603.380			3631.471	7	*MB*	27529.202		
3621.845	10	*MB*	27602.367	$15565°_{2\frac{1}{2}} - 43167_{1\frac{1}{2}}$	−90	3631.492	2	*MB*	27529.043		
3622.143	400	*MB*	27600.096	$6913°_{6\frac{1}{2}} - 34513_{6\frac{1}{2}}$	20	3631.750	6	*MB*	27527.088	$10088°_{1\frac{1}{2}} - 37615_{0\frac{1}{2}}$	−5
3622.404	60	*MB*	27598.107	$3363°_{2\frac{1}{2}} - 30961_{1\frac{1}{2}}$	16	3631.812	5	*MB*	27526.618	$5513_{5\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	−25
3622.439	8	*MT*	27597.841	$5118°_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	0					$2382°_{4\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−39
3622.536	2	*MB*	27597.102			3632.006	1	*MB*	27525.147		
3622.813	6	*MB*	27594.991			3632.096	140	*MB*	27524.465	$2641°_{3\frac{1}{2}} - 30166_{3\frac{1}{2}}$	−32
3623.149	1	*MB*	27592.432			3632.136	8	*MB*	27524.162	$3508°_{0\frac{1}{2}} - 31032_{0\frac{1}{2}}$	22
3623.351	6	*MB*	27590.894			3632.289	20	*MB*	27523.003	$8402°_{3\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−10
3623.738	350	*MB*	27587.948	$14404°_{7\frac{1}{2}} - 41992_{6\frac{1}{2}}$	−7	3632.529	5	*MB*	27521.185	$11007°_{1\frac{1}{2}} - 38529_{2\frac{1}{2}}$	−36
3623.832	400	*MB*	27587.232	$6389°_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	34	3632.620	7	*MB*	27520.495	$7341_{5\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	−23
3624.147	120	*MB*	27584.834	$2581°_{4\frac{1}{2}} - 30166_{3\frac{1}{2}}$	35	3632.775	10	*MB*	27519.321	$5118°_{2\frac{1}{2}} - 32638_{1\frac{1}{2}}$	−37
3624.456	12	*MB*	27582.483			3632.946	4	*MB*	27518.026		
3624.589	6	*MB*	27581.471			3633.078	5	*MB*	27517.026	$6638°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	−26
3624.647	5	*MB*	27581.029	$4910°_{5\frac{1}{2}} - 32492_{5\frac{1}{2}}$	−45	3633.240	3	*MB*	27515.799		
3624.676	2	*WA*	27580.809	$4737°_{2\frac{1}{2}} - 32318_{3\frac{1}{2}}$	7	3633.297	2	*MB*	27515.367		
3624.702	3	*MB*	27580.611	$5716°_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	22	3633.397	40	*MB*	27514.610	$0°_{3\frac{1}{2}} - 27514_{3\frac{1}{2}}$	−49
3624.798	10	*MB*	27579.880			3633.485	4	*MB*	27513.944		
3624.871	2	*MB*	27579.325			3633.941	6	*MB*	27510.491		
3624.893	7	*MB*	27579.158			3634.035	1	*MB*	27509.780		
3625.004	7	*MB*	27578.313	$12260°_{3\frac{1}{2}} - 39838_{2\frac{1}{2}}$	−43	3634.153	7	*MB*	27508.886		
3625.133	12	*MB*	27577.332	$5283°_{0\frac{1}{2}} - 32860_{0\frac{1}{2}}$	8	3634.183	2	*MB*	27508.659		
3625.194	2	*MB*	27576.868			3634.220	2	*MB*	27508.379		
3625.761	7	*MB*	27572.555	$3995°_{3\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−3	3634.415	7	*MB*	27506.903	$11325°_{2\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−24
3625.848	2	*MB*	27571.894			3634.635	2	*MB*	27505.239		
3626.443	3	*MB*	27567.370	$13515°_{3\frac{1}{2}} - 41083_{4\frac{1}{2}}$	−70	3634.738	5	*MB*	27504.459		
3626.640	6	*MB*	27565.873			3635.416	4	*MB*	27499.330		
3626.724	7	*MB*	27565.234	$7202°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	73	3635.509	5	*MB*	27498.626		
3626.860	7	*MB*	27564.201	$4201°_{1\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−14	3635.629	1	*MB*	27497.719		
3626.958	10	*MB*	27563.456	$10088°_{1\frac{1}{2}} - 37652_{2\frac{1}{2}}$	5	3635.786	8	*MB*	27496.531	$5010°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−40
3626.998	12	*MB*	27563.152	$3995°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−13	3635.880	8	*MB*	27495.820	$3593°_{4\frac{1}{2}} - 31089_{5\frac{1}{2}}$	−28
3627.341	7	*MB*	27560.546			3636.067	20	*MB*	27494.406	$5616_{4\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	−17
3627.850	1	*MB*	27556.679			3636.373	20	*MB*	27492.093	$11340°_{3\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−17
3628.190	15	*MB*	27554.097	$7259°_{3\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−29	3636.463	6	*MB*	27491.412	$10703_{4\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	−10
3628.248	80	*MB*	27553.656	$2581°_{4\frac{1}{2}} - 30134_{5\frac{1}{2}}$	3	3636.553	4	*MB*	27490.732	$1873°_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−73
3628.493	10	*MB*	27551.796	$14481°_{2\frac{1}{2}} - 42033_{2\frac{1}{2}}$	71	3636.583	7	*MB*	27490.505	$20554_{5\frac{1}{2}} - 48045°_{6\frac{1}{2}}$	2
3628.823	5	*MB*	27549.290			3636.733	6	*MB*	27489.372	$3745°_{1\frac{1}{2}} - 31234_{2\frac{1}{2}}$	−31
3628.915	2	*MB*	27548.592	$10646_{5\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	−65	3637.180	1	*MB*	27485.993		
3629.001	1	*MB*	27547.939			3637.463	10	*MB*	27483.855	$2581°_{4\frac{1}{2}} - 30065_{3\frac{1}{2}}$	−51
3629.623	5	*MB*	27543.218			3637.747	80	*MB*	27481.709	$3593°_{4\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−11
3630.026	5	*MB*	27540.161			3638.044	20	*MB*	27479.466	$7746°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−4
3630.228	2	*MB*	27538.628			3638.201	2	*MB*	27478.280		
3630.317	2	*MB*	27537.953			3638.280	120	*MB*	27477.683	$5819°_{4\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−8
3630.419	50	*MB*	27537.180	$10114°_{2\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−27	3638.506	2	*MB*	27475.977		
3630.515	1	*MB*	27536.451			3638.965	3	*MB*	27472.511		
3630.773	8	*MB*	27534.495	$4203°_{6\frac{1}{2}} - 31738_{5\frac{1}{2}}$	−54	3639.032	1	*MB*	27472.005		
3630.806	8	*MB*	27534.245	$7278°_{1\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−34	3639.173	8	*MB*	27470.941		
3630.920	3	*MB*	27533.380			3639.324	10	*MB*	27469.801	$4844°_{1\frac{1}{2}} - 32314_{0\frac{1}{2}}$	−23
3630.983	2	*MB*	27532.902			3639.452	10	*MB*	27468.835	$11340°_{3\frac{1}{2}} - 38809_{3\frac{1}{2}}$	−42
3631.191	180	*MB*	27531.325	$3703°_{3\frac{1}{2}} - 31234_{2\frac{1}{2}}$	40	3639.569	15	*MB*	27467.952	$7878°_{3\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−1

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3639.685	6	*MB*	27467.077	$5942°_{3\frac{1}{2}}-33409_{3\frac{1}{2}}$	−21					$8402°_{3\frac{1}{2}}-35807_{4\frac{1}{2}}$	23
3639.872	8	*MB*	27465.665	$3363°_{2\frac{1}{2}}-30829_{3\frac{1}{2}}$	−31	3648.098	12	*MB*	27403.735	$5675°_{4\frac{1}{2}}-33079_{3\frac{1}{2}}$	−13
3639.905	3	*MB*	27465.417			3648.146	1	*MB*	27403.375		
3640.330	1	*MB*	27462.210			3648.272	6	*MB*	27402.429	$5010°_{2\frac{1}{2}}-32413_{3\frac{1}{2}}$	−46
3640.427	1	*MB*	27461.478			3648.603	10	*MB*	27399.943		
3640.694	40	*MB*	27459.464	$6517°_{2\frac{1}{2}}-33977_{3\frac{1}{2}}$	−56	3648.695	2	*MB*	27399.252		
3640.802	2	*MB*	27458.650			3648.778	1	*MB*	27398.629		
3641.549	15	*MB*	27453.017	$3508°_{0\frac{1}{2}}-30961_{1\frac{1}{2}}$	−30	3648.815	10	*MB*	27398.351	$8804°_{4\frac{1}{2}}-36202_{4\frac{1}{2}}$	18
3641.645	5	*MB*	27452.294			3648.890	9	*MB*	27397.788		
3641.730	15	*MB*	27451.653	$7746°_{2\frac{1}{2}}-35197_{1\frac{1}{2}}$	−1	3649.183	4	*MB*	27395.588		
3641.840	2	*MB*	27450.824			3649.516	2	*MB*	27393.088		
3641.964	1	*MB*	27449.889			3649.731	40	*MB*	27391.474	$4459°_{3\frac{1}{2}}-31851_{2\frac{1}{2}}$	−50
3642.245	10	*MB*	27447.772	$15281_{6\frac{1}{2}}-42729°_{5\frac{1}{2}}$	−72	3649.829	2	*MB*	27390.739		
3642.655	8	*MB*	27444.682	$9634°_{1\frac{1}{2}}-37078_{1\frac{1}{2}}$	−10	3649.913	1	*MB*	27390.109		
3642.829	50	*MB*	27443.371	$4322°_{2\frac{1}{2}}-31766_{1\frac{1}{2}}$	−29	3649.944	1	*MB*	27389.876	$20940_{3\frac{1}{2}}-48330°_{3\frac{1}{2}}$	−74
3642.933	1	*MB*	27442.588			3650.022	2	*MB*	27389.291		
3643.016	8	*MB*	27441.963	$10088°_{1\frac{1}{2}}-37530_{1\frac{1}{2}}$	−29	3650.115	7	*MB*	27388.593	$5118°_{2\frac{1}{2}}-32507_{1\frac{1}{2}}$	−42
3643.067	1	*MB*	27441.578			3650.141	80	*MB*	27388.398	$2595°_{1\frac{1}{2}}-29984_{1\frac{1}{2}}$	−9
3643.123	2	*MB*	27441.157			3650.195	8	*MB*	27387.993		
3643.199	2	*MB*	27440.584			3650.262	6	*MB*	27387.490		
3643.338	3	*MB*	27439.537			3650.880	160	*MB*	27382.854	$8175°_{2\frac{1}{2}}-35558_{3\frac{1}{2}}$	15
3643.583	2	*MB*	27437.692			3651.014	7	*MB*	27381.849	$3363°_{2\frac{1}{2}}-30745_{1\frac{1}{2}}$	−9
3643.885	4	*MB*	27435.418			3651.318	12	*MB*	27379.569		
3643.921	4	*MB*	27435.147	$8702°_{1\frac{1}{2}}-36137_{2\frac{1}{2}}$	−12	3651.646	15	*MB*	27377.110	$10274°_{3\frac{1}{2}}-37652_{2\frac{1}{2}}$	−9
3644.299	40	*MB*	27432.302	$14315°_{0\frac{1}{2}}-41748_{1\frac{1}{2}}$	−44	3651.690	5	*MB*	27376.780		
3644.348	4	*MB*	27431.933			3652.111	120	*MB*	27373.624	$3995°_{3\frac{1}{2}}-31369_{2\frac{1}{2}}$	−8
3644.412	7	*MB*	27431.451			3652.266	60	*MB*	27372.463	$5616_{4\frac{1}{2}}-32989°_{3\frac{1}{2}}$	−15
3644.443	3	*MB*	27431.218	$15281_{6\frac{1}{2}}-42712°_{6\frac{1}{2}}$	10	3652.326	10	*MB*	27372.013	$12466°_{1\frac{1}{2}}-39838_{2\frac{1}{2}}$	−1
3644.542	10	*MB*	27430.473	$2634°_{2\frac{1}{2}}-30065_{3\frac{1}{2}}$	−24					$3703°_{3\frac{1}{2}}-31075_{4\frac{1}{2}}$	4
3644.974	8	*MB*	27427.222	$6549°_{2\frac{1}{2}}-33977_{3\frac{1}{2}}$	−9	3652.481	7	*MB*	27370.852		
3645.090	8	*MB*	27426.349	$4511°_{2\frac{1}{2}}-31937_{3\frac{1}{2}}$	−46	3652.675	2	*MB*	27369.398		
3645.228	120	*MB*	27425.311	$5437°_{3\frac{1}{2}}-32862_{3\frac{1}{2}}$	−33	3652.789	3	*MB*	27368.544		
3645.293	10	*MB*	27424.822	$2382°_{4\frac{1}{2}}-29807_{3\frac{1}{2}}$	−9	3652.896	3	*MB*	27367.742		
3645.426	8	*MB*	27423.821			3652.918	4	*MB*	27367.577		
3645.457	120	*MB*	27423.588	$5616_{4\frac{1}{2}}-33040°_{4\frac{1}{2}}$	−25	3653.021	3	*MB*	27366.806		
				$2641°_{3\frac{1}{2}}-30065_{3\frac{1}{2}}$	−16						
						3653.102	380	*MB*	27366.199	$2879°_{5\frac{1}{2}}-30245_{4\frac{1}{2}}$	16
3645.705	10	*MB*	27421.722	$11387°_{3\frac{1}{2}}-38809_{3\frac{1}{2}}$	−22	3653.194	2	*MB*	27365.510		
3645.863	6	*MB*	27420.534			3653.419	4	*MB*	27363.825		
3646.210	4	*MB*	27417.925			3653.664	600	*MB*	27361.990	$3793°_{6\frac{1}{2}}-31155_{6\frac{1}{2}}$	1
3646.445	4	*MB*	27416.158			3654.015	4	*MB*	27359.361	$2634°_{2\frac{1}{2}}-29994_{2\frac{1}{2}}$	−13
3646.506	2	*MB*	27415.699	$10114°_{2\frac{1}{2}}-37530_{1\frac{1}{2}}$	−50	3654.097	10	*MB*	27358.747	$6517°_{2\frac{1}{2}}-33876_{1\frac{1}{2}}$	−10
3646.651	140	*MB*	27414.609	$4523°_{4\frac{1}{2}}-31937_{3\frac{1}{2}}$	−10	3654.202	10	*MB*	27357.961	$13117_{4\frac{1}{2}}-40475°_{3\frac{1}{2}}$	−41
3646.961	320	*MB*	27412.279	$2382°_{4\frac{1}{2}}-29794_{3\frac{1}{2}}$	8	3654.322	2	*MB*	27357.063		
3647.224	7	*MB*	27410.302			3654.424	3	*MB*	27356.299		
3647.261	3	*MB*	27410.024			3654.458	3	*MB*	27356.045		
3647.541	10	*MB*	27407.920	$4523°_{4\frac{1}{2}}-31930_{4\frac{1}{2}}$	17	3654.585	10	*MB*	27355.094	$6521°_{1\frac{1}{2}}-33876_{1\frac{1}{2}}$	49
3647.597	15	*MB*	27407.499	$7818°_{1\frac{1}{2}}-35225_{2\frac{1}{2}}$	−9					$5283°_{0\frac{1}{2}}-32638_{1\frac{1}{2}}$	−41
3647.754	240	*MB*	27406.320	$7522°_{5\frac{1}{2}}-34928_{4\frac{1}{2}}$	−27	3654.630	2	*MB*	27354.758		
3647.856	9	*MB*	27405.553			3654.734	4	*MB*	27353.979	$5942°_{3\frac{1}{2}}-33296_{4\frac{1}{2}}$	−27
3647.940	240	*MB*	27404.922	$17232_{7\frac{1}{2}}-44637°_{6\frac{1}{2}}$	27	3654.936	280	*MB*	27352.467	$2641°_{3\frac{1}{2}}-29994_{2\frac{1}{2}}$	−14

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3655.092	3	*MB*	27351.300			3661.620	10	*MB*	27302.539		
3655.348	10	*MB*	27349.384	$2634°_{2\frac{1}{2}} - 29984_{1\frac{1}{2}}$	−1	3661.746	120	*MB*	27301.599	$4266°_{3\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−22
3655.653	9	*MB*	27347.103	$987°_{4\frac{1}{2}} - 28334_{4\frac{1}{2}}$	−41	3661.833	3	*MB*	27300.951	$16159°_{3\frac{1}{2}} - 43460_{2\frac{1}{2}}$	−45
3655.843	1600	*MB*	27345.681	$2563°_{5\frac{1}{2}} - 29908_{4\frac{1}{2}}$	11	3661.911	10	*MB*	27300.369	$2879°_{5\frac{1}{2}} - 30180_{6\frac{1}{2}}$	−31
3656.030	3	*MB*	27344.283			3662.197	6	*MB*	27298.237		
3656.071	1	*MB*	27343.976			3662.242	1	*MB*	27297.902	$15235_{1\frac{1}{2}} - 42533°_{1\frac{1}{2}}$	22
3656.291	10	*MB*	27342.331	$13515°_{3\frac{1}{2}} - 40858_{4\frac{1}{2}}$	−20	3662.283	7	*MB*	27297.596	$3745°_{1\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−38
3656.421	2	*MB*	27341.359			3662.417	3	*MB*	27296.597		
3656.591	10	*MB*	27340.088	$4511°_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	−51	3662.489	12	*MB*	27296.061	$3793°_{6\frac{1}{2}} - 31089_{5\frac{1}{2}}$	−35
3656.754	20	*MB*	27338.869	$6638°_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−12	3662.761	6	*MB*	27294.034	$4844°_{1\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−19
3656.884	3	*MB*	27337.897	$12057°_{2\frac{1}{2}} - 39394_{3\frac{1}{2}}$	12	3663.006	90	*MB*	27292.208	$4266°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−20
3656.958	10	*MB*	27337.344			3663.204	7	*MB*	27290.733	$6517°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	36
3657.046	5	*MB*	27336.686			3663.292	3	*MB*	27290.078		
3657.093	1	*MB*	27336.335			3663.421	7	*MB*	27289.117		
3657.239	2	*MB*	27335.244			3663.640	12	*MB*	27287.486		
3657.370	10	*MB*	27334.265			3663.706	80	*MB*	27286.994	$6521°_{1\frac{1}{2}} - 33808_{2\frac{1}{2}}$	9
3657.502	1	*MB*	27333.278							$4910°_{5\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−24
3657.642	6	*MB*	27332.232	$10641°_{2\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−96	3663.802	6	*MB*	27286.279		
3657.692	10	*MB*	27331.858	$5964°_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−50	3664.066	3	*MB*	27284.313		
3657.757	2	*MB*	27331.373			3664.199	6	*MB*	27283.323	$13436_{2\frac{1}{2}} - 40720°_{1\frac{1}{2}}$	59
3657.848	1	*MB*	27330.693			3664.456	8	*MB*	27281.409	$8175°_{2\frac{1}{2}} - 35457_{1\frac{1}{2}}$	−45
3657.908	5	*MB*	27330.244			3664.755	50	*MB*	27279.184	$5437°_{3\frac{1}{2}} - 32716_{2\frac{1}{2}}$	−40
3658.053	10	*MB*	27329.161			3664.950	10	*MB*	27277.732	$8280°_{2\frac{1}{2}} - 35558_{3\frac{1}{2}}$	−23
3658.094	10	*MB*	27328.855	$5716°_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−23	3665.001	15	*MB*	27277.353		
3658.233	5	*MB*	27327.816	$5969°_{5\frac{1}{2}} - 33296_{4\frac{1}{2}}$	19	3665.054	70	*MB*	27276.958	$3854_{3\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	−12
3658.259	40	*MB*	27327.622	$2581°_{4\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−24	3665.317	2	*MB*	27275.001	$8927°_{5\frac{1}{2}} - 36202_{4\frac{1}{2}}$	−41
3658.413	6	*MB*	27326.472	$6549°_{2\frac{1}{2}} - 33876_{1\frac{1}{2}}$	3	3665.358	4	*MB*	27274.696		
3658.663	1	*MB*	27324.605			3665.441	4	*MB*	27274.078		
3658.764	5	*MB*	27323.850			3665.494	8	*MB*	27273.684	$3363°_{2\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−45
3658.850	3	*MB*	27323.208			3665.816	2	*MB*	27271.288		
3658.903	1	*MB*	27322.812			3666.112	4	*MB*	27269.087		
3659.074	9	*MB*	27321.536			3666.170	2	*MB*	27268.655		
3659.226	400	*MB*	27320.401	$1410°_{4\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−6	3666.264	2	*MB*	27267.956		
3659.303	3	*MB*	27319.826	$11759_{5\frac{1}{2}} - 39079°_{5\frac{1}{2}}$	−4	3666.346	15	*MB*	27267.346	$2641°_{3\frac{1}{2}} - 29908_{4\frac{1}{2}}$	1
3659.334	3	*MB*	27319.594			3666.501	5	*MB*	27266.194		
3659.733	1	*MB*	27316.616			3666.722	6	*MB*	27264.550		
3659.809	1	*MB*	27316.049			3666.803	1	*MB*	27263.948		
3659.891	4	*MB*	27315.437			3666.893	3	*MB*	27263.279		
3659.972	320	*MB*	27314.832	$1410°_{4\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−11	3666.951	2	*MB*	27262.848		
3660.089	5	*MB*	27313.959			3666.985	4	*MB*	27262.595		
3660.151	160	*MB*	27313.497	$10274°_{3\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−4	3667.045	2	*MB*	27262.149	$11007°_{1\frac{1}{2}} - 38269_{0\frac{1}{2}}$	−25
3660.393	12	*MB*	27311.691			3667.285	80	*MB*	27260.365	$5819°_{4\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−33
3660.506	2	*MB*	27310.848			3667.328	1	*MB*	27260.045		
3660.559	4	*MB*	27310.452			3667.549	10	*MB*	27258.402	$6549°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−6
3660.639	800	*MB*	27309.855	$987°_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−6	3667.609	2	*MB*	27257.957	$13217_{3\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	8
3660.895	1	*MB*	27307.946			3667.773	2	*MB*	27256.738		
3660.916	6	*MB*	27307.789	$8804°_{4\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−7	3667.976	800	*MB*	27255.229	$2879°_{5\frac{1}{2}} - 30134_{5\frac{1}{2}}$	15
3661.031	3	*MB*	27306.931			3668.070	2	*MB*	27254.531		
3661.112	4	*MB*	27306.327			3668.140	4	*MB*	27254.011		
3661.400	3	*MB*	27304.179			3668.188	2	*MB*	27253.654	$10088°_{1\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−32

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3668.280	7	*MB*	27252.971	$5924°_{1\,1/2}-33177_{0\,1/2}$	−20	3675.142	5	*MB*	27202.087		
3668.382	3	*MB*	27252.213			3675.262	5	*MB*	27201.199	$11340°_{3\,1/2}-38541_{4\,1/2}$	−75
3668.451	4	*MB*	27251.700			3675.364	15	*MB*	27200.444	$9723°_{4\,1/2}-36923_{4\,1/2}$	−9
3668.566	3	*MB*	27250.846			3675.507	10	*MB*	27199.386	$5118°_{2\,1/2}-32318_{3\,1/2}$	17
3668.728	140	*MB*	27249.643	$0°_{3\,1/2}-27249_{2\,1/2}$	−25	3675.578	12	*MB*	27198.860	$13659°_{4\,1/2}-40858_{4\,1/2}$	−15
3668.900	3	*MB*	27248.365			3675.724	10	*MB*	27197.780	$10454°_{1\,1/2}-37652_{2\,1/2}$	−38
3669.089	10	*MB*	27246.962	$9269°_{0\,1/2}-36516_{1\,1/2}$	−9	3676.155	80	*MB*	27194.591	$2595°_{1\,1/2}-29790_{0\,1/2}$	−34
3669.222	3	*MB*	27245.974			3676.380	3	*MB*	27192.927		
3669.301	3	*MB*	27245.388			3676.434	1	*MB*	27192.527		
3669.489	1	*MB*	27243.992			3676.496	1	*MB*	27192.069		
3670.054	5	*MB*	27239.798			3676.547	2	*MB*	27191.692		
3670.112	5	*MB*	27239.367	$3995°_{3\,1/2}-31234_{2\,1/2}$	−51	3676.695	4	*MB*	27190.597		
3670.266	2	*MB*	27238.224			3676.720	2	*MB*	27190.412		
3670.470	9	*MB*	27236.711			3676.788	1	*MB*	27189.909		
3670.520	80	*MB*	27236.339	$7059°_{4\,1/2}-34295_{4\,1/2}$	−38	3676.997	9	*MB*	27188.364	$11340°_{3\,1/2}-38529_{2\,1/2}$	−58
3670.579	8	*MB*	27235.902	$4322°_{2\,1/2}-31558_{3\,1/2}$	−15	3677.180	10	*MB*	27187.011	$5675°_{4\,1/2}-32862_{3\,1/2}$	7
3670.671	10	*MB*	27235.219	$3593°_{4\,1/2}-30829_{3\,1/2}$	−22					$0°_{3\,1/2}-27187_{3\,1/2}$	−35
3670.861	10	*MB*	27233.809			3677.372	1	*MB*	27185.592		
3671.071	5	*MB*	27232.252			3677.635	4	*MB*	27183.648	$5964°_{3\,1/2}-33148_{2\,1/2}$	−44
3671.157	1	*MB*	27231.614			3677.746	5	*MB*	27182.827		
3671.422	1	*MB*	27229.648			3677.902	7	*MB*	27181.675		
3671.545	6	*MB*	27228.736			3677.926	40	*MB*	27181.497		
3671.942	120	*MB*	27225.792	$2581°_{4\,1/2}-29807_{3\,1/2}$	−28	3678.029	7	*MB*	27180.736		
3672.166	200	*MT*	27224.131	$1410°_{4\,1/2}-28634_{5\,1/2}$	−80	3678.050	7	*MB*	27180.580		
3672.252	10	*MB*	27223.494	$7202°_{2\,1/2}-34426_{2\,1/2}$	−13	3678.232	10	*MB*	27179.236	$4165_{4\,1/2}-31344°_{3\,1/2}$	−41
3672.302	2	*MB*	27223.123			3678.274	1	*MB*	27178.925		
3672.523	1	*MB*	27221.485			3678.348	10	*MB*	27178.378		
3672.788	320	*MB*	27219.521	$7293°_{6\,1/2}-34513_{6\,1/2}$	−8	3678.483	3	*MB*	27177.381		
3672.925	6	*MB*	27218.506			3678.640	2	*MB*	27176.221		
3673.046	3	*MB*	27217.609			3678.784	6	*MB*	27175.158	$10798°_{2\,1/2}-37973_{3\,1/2}$	−62
3673.107	1	*MB*	27217.157			3678.859	20	*MB*	27174.603	$7746°_{2\,1/2}-34920_{3\,1/2}$	1
3673.181	2	*MB*	27216.609	$13503_{0\,1/2}-40720°_{1\,1/2}$	−4	3678.972	3	*MB*	27173.769		
3673.259	12	*MB*	27216.031	$19481_{4\,1/2}-46697°_{4\,1/2}$	−12	3679.043	8	*MB*	27173.245	$6638°_{4\,1/2}-33811_{4\,1/2}$	−63
				$3745°_{1\,1/2}-30961_{1\,1/2}$	−11	3679.154	80	*MB*	27172.425	$2634°_{2\,1/2}-29807_{3\,1/2}$	13
3673.553	3	*MB*	27213.853			3679.425	200	*MB*	27170.423	$8175°_{2\,1/2}-35346_{3\,1/2}$	5
3673.636	160	*MB*	27213.238	$2581°_{4\,1/2}-29794_{3\,1/2}$	−21	3679.544	4	*MB*	27169.545		
3673.690	3	*MB*	27212.838	$10924°_{4\,1/2}-38137_{5\,1/2}$	32	3679.713	8	*MB*	27168.297		
3673.741	12	*MB*	27212.460	$3995°_{3\,1/2}-31207_{3\,1/2}$	−6	3679.899	10	*MB*	27166.924	$7259°_{3\,1/2}-34426_{2\,1/2}$	−37
3673.793	8	*MB*	27212.075			3680.092	160	*MB*	27165.499	$2641°_{3\,1/2}-29807_{3\,1/2}$	−19
3673.902	1	*MB*	27211.268			3680.438	10	*MB*	27162.945	$10641°_{2\,1/2}-37804_{1\,1/2}$	−46
3674.060	40	*MB*	27210.098	$9634°_{1\,1/2}-36844_{2\,1/2}$	−20	3680.546	1	*MB*	27162.148		
3674.137	40	*MB*	27209.527	$10924°_{4\,1/2}-38134_{4\,1/2}$	4	3680.649	10	*MB*	27161.388	$10454°_{1\,1/2}-37615_{0\,1/2}$	−73
3674.390	5	*MB*	27207.654	$7713°_{4\,1/2}-34920_{3\,1/2}$	−44	3680.785	8	*MB*	27160.385	$10035°_{5\,1/2}-37196_{4\,1/2}$	−42
3674.468	12	*MB*	27207.076	$10641°_{2\,1/2}-37848_{2\,1/2}$	−31	3680.861	40	*MB*	27159.824	$2634°_{2\,1/2}-29794_{3\,1/2}$	−26
3674.653	6	*MB*	27205.707	$5942°_{3\,1/2}-33148_{2\,1/2}$	−83	3681.106	15	*MB*	27158.016		
3674.720	9	*MB*	27205.211			3681.183	2	*MB*	27157.448		
3674.754	1	*MB*	27204.959	$18393_{3\,1/2}-45598°_{3\,1/2}$	−14	3681.376	160	*MB*	27156.024	$8402°_{3\,1/2}-35558_{3\,1/2}$	−9
3674.856	4	*MB*	27204.204			3681.638	9	*MB*	27154.092	$17976_{2\,1/2}-45130°_{2\,1/2}$	−23
3674.897	4	*MB*	27203.900							$11387°_{3\,1/2}-38541_{4\,1/2}$	−49
3674.989	9	*MB*	27203.219	$11325°_{2\,1/2}-38529_{2\,1/2}$	−20	3681.800	7	*MB*	27152.897	$2641°_{3\,1/2}-29794_{3\,1/2}$	−60

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3681.886	5	*MB*	27152.263			3688.030	7	*MB*	27107.030	$19481_{4\frac{1}{2}} - 46588°_{5\frac{1}{2}}$	−60
3682.079	160	*MB*	27150.840	$5651°_{5\frac{1}{2}} - 32802_{5\frac{1}{2}}$	32	3688.116	4	*MB*	27106.398		
3682.178	2	*MB*	27150.110			3688.292	9	*MB*	27105.105		
3682.241	7	*MB*	27149.645			3688.426	7	*MB*	27104.120	$7061°_{0\frac{1}{2}} - 34166_{1\frac{1}{2}}$	−80
3682.296	1	*MB*	27149.240			3688.674	60	*MB*	27102.298	$5513_{5\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	−11
										$5942°_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	1
3682.489	8	*MB*	27147.817								
3682.495	3	*MB*	27147.773			3688.762	6	*MB*	27101.651		
3682.518	7	*MB*	27147.604			3688.806	3	*MB*	27101.328		
3682.589	2	*MB*	27147.080	$7278°_{1\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−34	3688.935	1	*MB*	27100.380		
3682.662	10	*MB*	27146.542	$5716°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−8	3688.978	2	*MB*	27100.065		
3682.799	1	*MB*	27145.532			3689.100	3	*MB*	27099.168		
3682.845	1	*MB*	27145.193			3689.161	40	*MB*	27098.720	$4459°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−33
3682.888	2	*MB*	27144.876			3689.255	6	*MB*	27098.030	$7061°_{0\frac{1}{2}} - 34159_{0\frac{1}{2}}$	−8
3683.089	10	*MB*	27143.394			3689.354	2	*MB*	27097.303		
3683.380	10	*MB*	27141.250	$11387°_{3\frac{1}{2}} - 38529_{2\frac{1}{2}}$	−39	3689.504	10	*MB*	27096.201	$7059°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	−37
3683.468	10	*MB*	27140.602			3689.783	2	*MB*	27094.152		
3683.565	1	*MB*	27139.887			3690.380	3	*MB*	27089.769		
3683.583	1	*MB*	27139.754			3690.494	6	*MB*	27088.932		
3683.815	9	*MB*	27138.045			3690.629	7	*MB*	27087.942		
3684.003	4	*MB*	27136.660	$5942°_{3\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−53	3691.066	8	*MB*	27084.735		
3684.128	10	*MB*	27135.740	$15593_{6\frac{1}{2}} - 42729°_{5\frac{1}{2}}$	−46	3691.138	1	*MB*	27084.206		
3684.242	12	*MB*	27134.900	$12260°_{3\frac{1}{2}} - 39394_{3\frac{1}{2}}$	−4	3691.880	7	*MB*	27078.763		
3684.352	2	*MB*	27134.090			3691.922	2	*MB*	27078.455		
3684.516	1	*MB*	27132.882			3691.954	3	*MB*	27078.220	$2595°_{1\frac{1}{2}} - 29673_{2\frac{1}{2}}$	94
3684.725	10	*MB*	27131.343			3692.068	10	*MB*	27077.384		
3684.774	6	*MB*	27130.982			3692.213	10	*MB*	27076.321	$10454°_{1\frac{1}{2}} - 37530_{1\frac{1}{2}}$	−39
3684.834	8	*MB*	27130.541	$7202°_{2\frac{1}{2}} - 34333_{2\frac{1}{2}}$	−27	3692.406	3	*MB*	27074.906		
3684.879	2	*MB*	27130.209			3692.560	10	*MB*	27073.777		
3684.987	12	*MB*	27129.414			3692.677	1	*MB*	27072.919		
3685.204	10	*MB*	27127.817	$5010°_{2\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−10	3692.991	2	*MB*	27070.617		
3685.315	2	*MB*	27127.000	$11325°_{2\frac{1}{2}} - 38452_{1\frac{1}{2}}$	31	3693.272	2	*MB*	27068.557		
3685.402	6	*MB*	27126.359	$5675°_{4\frac{1}{2}} - 32802_{5\frac{1}{2}}$	−42	3693.441	80	*MB*	27067.319	$10274°_{3\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−36
3685.518	10	*MB*	27125.506	$3703°_{3\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−23	3693.481	2	*MB*	27067.026	$7746°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	9
3685.763	1	*MB*	27123.703			3693.535	2	*MB*	27066.630		
3685.874	1	*MB*	27122.886			3693.614	4	*MB*	27066.051		
3686.116	5	*MB*	27121.105			3693.714	40	*MB*	27065.318	$9778°_{2\frac{1}{2}} - 36844_{2\frac{1}{2}}$	0
3686.266	12	*MB*	27120.002	$10684°_{0\frac{1}{2}} - 37804_{1\frac{1}{2}}$	9					$8280°_{2\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−17
3686.401	9	*MB*	27119.009			3693.917	7	*MB*	27063.831		
3686.599	7	*MB*	27117.552	$10114°_{2\frac{1}{2}} - 37232_{1\frac{1}{2}}$	−2	3694.002	6	*MB*	27063.208		
3686.649	4	*MB*	27117.184			3694.184	8	*MB*	27061.875	$7233°_{5\frac{1}{2}} - 34295_{4\frac{1}{2}}$	52
										$3363°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−46
3686.992	6	*MB*	27114.662	$5964°_{3\frac{1}{2}} - 33079_{3\frac{1}{2}}$	46						
3687.191	1	*MB*	27113.198			3694.208	5	*MB*	27061.699		
3687.408	1	*MB*	27111.603			3694.252	3	*MB*	27061.377		
3687.469	3	*MB*	27111.154			3694.372	4	*MB*	27060.498		
3687.549	9	*MB*	27110.566			3694.457	8	*MB*	27059.875		
3687.745	5	*MB*	27109.125	$12762°_{4\frac{1}{2}} - 39871_{4\frac{1}{2}}$	−66	3694.661	2	*MB*	27058.381		
3687.801	160	*MB*	27108.714	$3593°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	−13	3694.714	2	*MB*	27057.993		
3687.910	5	*MB*	27107.912			3694.914	240	*MB*	27056.529	$2382°_{4\frac{1}{2}} - 29438_{5\frac{1}{2}}$	−41
3687.965	4	*MB*	27107.508			3694.956	3	*MB*	27056.221		
3687.986	3	*MB*	27107.354			3695.140	1	*MB*	27054.874		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3695.242	6	*MB*	27054.127	$7278°_{1\frac{1}{2}} - 34333_{2\frac{1}{2}}$	−48	3699.830	3	*MB*	27020.579		
3695.294	4	*MB*	27053.746			3699.915	120	*MB*	27019.958	$6389°_{4\frac{1}{2}} - 33409_{3\frac{1}{2}}$	4
3695.367	1	*MB*	27053.212							$4910°_{5\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−14
3695.429	6	*MB*	27052.758	$6521°_{1\frac{1}{2}} - 33574_{1\frac{1}{2}}$	−54	3700.038	3	*MB*	27019.060		
3695.564	8	*MB*	27051.770			3700.161	1	*MB*	27018.162		
3695.684	1	*MB*	27050.891			3700.281	2	*MB*	27017.286		
3695.736	2	*MB*	27050.511			3700.317	3	*MB*	27017.023		
3695.778	7	*MB*	27050.203			3700.368	1	*MB*	27016.651		
3695.815	3	*MB*	27049.933	$10798°_{2\frac{1}{2}} - 37848_{2\frac{1}{2}}$	−61	3700.437	1	*MB*	27016.147		
3695.841	6	*MB*	27049.742	$8175°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−50	3700.484	3	*MB*	27015.804		
3695.962	60	*MB*	27048.857	$10924°_{4\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−42	3700.524	1	*MB*	27015.512		
3696.131	50	*MB*	27047.620	$3995°_{3\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−29	3700.703	6	*MB*	27014.205	$13659°_{4\frac{1}{2}} - 40673_{5\frac{1}{2}}$	−40
3696.169	2	*MB*	27047.342	$4511°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−26	3700.766	7	*MB*	27013.745		
3696.307	9	*MB*	27046.332	$4322°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	−52	3700.894	5	*MB*	27012.811		
3696.402	1	*MB*	27045.637	$10924°_{4\frac{1}{2}} - 37970_{5\frac{1}{2}}$	−18	3701.194	10	*MB*	27010.622	$10641°_{2\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−26
3696.498	9	*MB*	27044.935	$4523°_{4\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−50	3701.465	1	*MB*	27008.644		
3696.678	10	*MB*	27043.618	$5819°_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−35	3701.532	1	*MB*	27008.155		
3696.721	1	*MB*	27043.303			3701.595	1	*MB*	27007.696	$15565°_{2\frac{1}{2}} - 42573_{3\frac{1}{2}}$	−74
3696.838	2	*MB*	27042.447	$7878°_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−12	3701.644	2	*MB*	27007.338		
3696.930	4	*MB*	27041.774			3701.729	10	*MB*	27006.718	$4844°_{1\frac{1}{2}} - 31851_{2\frac{1}{2}}$	−34
3697.125	3	*MB*	27040.348			3701.851	10	*MB*	27005.828	$10798°_{2\frac{1}{2}} - 37804_{1\frac{1}{2}}$	−50
3697.150	1	*MB*	27040.165			3702.024	1	*MB*	27004.566		
3697.204	1	*MB*	27039.770			3702.071	3	*MB*	27004.223	$9198°_{3\frac{1}{2}} - 36202_{4\frac{1}{2}}$	−7
3697.304	6	*MB*	27039.039	$13436_{2\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	−31	3702.187	10	*MB*	27003.377	$8804°_{4\frac{1}{2}} - 35807_{4\frac{1}{2}}$	33
3697.673	100	*MB*	27036.341	$7259°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−33	3702.597	10	*MB*	27000.387	$5716°_{3\frac{1}{2}} - 32716_{2\frac{1}{2}}$	−43
3697.716	5	*MB*	27036.027			3702.788	100	*MB*	26998.994	$3703°_{3\frac{1}{2}} - 30702_{4\frac{1}{2}}$	−21
3697.746	1	*MB*	27035.807			3702.891	4	*MB*	26998.243		
3697.781	5	*MB*	27035.551	$4523°_{4\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−41	3703.096	4	*MB*	26996.749		
3697.909	6	*MB*	27034.616			3703.170	3	*MB*	26996.209		
3698.137	50	*MB*	27032.949	$4201°_{1\frac{1}{2}} - 31234_{2\frac{1}{2}}$	−36	3703.229	4	*MB*	26995.779		
3698.163	10	*MB*	27032.759			3703.339	1	*MB*	26994.977	$7818°_{1\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−77
3698.370	90	*MB*	27031.246	$6521°_{1\frac{1}{2}} - 33552_{2\frac{1}{2}}$	−3	3703.574	7	*MB*	26993.264		
3698.415	3	*MB*	27030.917			3703.681	1	*MB*	26992.485		
3698.483	4	*MB*	27030.420			3703.779	7	*MB*	26991.770		
3698.650	110	*MB*	27029.199	$12365°_{4\frac{1}{2}} - 39394_{3\frac{1}{2}}$	13	3703.909	10	*MB*	26990.823	$7522°_{5\frac{1}{2}} - 34513_{6\frac{1}{2}}$	−23
				$2879°_{5\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−9						
						3703.988	7	*MB*	26990.247	$10088°_{1\frac{1}{2}} - 37078_{1\frac{1}{2}}$	9
3698.715	10	*MB*	27028.725	$4737°_{2\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−10	3704.091	7	*MB*	26989.497		
3698.754	3	*MB*	27028.440			3704.142	7	*MB*	26989.125		
3698.793	1	*MB*	27028.155	$8169°_{1\frac{1}{2}} - 35197_{1\frac{1}{2}}$	13	3704.213	1	*MB*	26988.608		
3698.867	3	*MB*	27027.614			3704.362	8	*MB*	26987.522		
3698.995	1	*MB*	27026.679			3704.444	6	*MB*	26986.925		
3699.183	12	*MB*	27025.305	$9491°_{0\frac{1}{2}} - 36516_{1\frac{1}{2}}$	0	3704.485	6	*MB*	26986.626		
3699.238	3	*MB*	27024.903			3704.662	12	*MB*	26985.337	$7059°_{4\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−31
3699.300	5	*MB*	27024.450			3704.765	3	*MB*	26984.587		
3699.555	3	*MB*	27022.588	$15510_{0\frac{1}{2}} - 42533°_{1\frac{1}{2}}$	−85	3704.979	180	*MB*	26983.028	$5819°_{4\frac{1}{2}} - 32802_{5\frac{1}{2}}$	−23
3699.567	3	*MB*	27022.500			3705.054	30	*MB*	26982.482	$2382°_{4\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−11
3699.580	3	*MB*	27022.406			3705.357	12	*MB*	26980.276		
3699.645	6	*MB*	27021.930	$8175°_{2\frac{1}{2}} - 35197_{1\frac{1}{2}}$	−46	3705.736	2	*MB*	26977.516		
3699.711	4	*MB*	27021.448	$7746°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	−57	3705.774	3	*MB*	26977.240		
3699.775	6	*MB*	27020.981			3705.954	4	*MB*	26975.929	$5437°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	6

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3706.024	20	*MB*	26975.420			3713.193	6	*MB*	26923.340		
3706.051	2	*MB*	26975.223			3713.375	1	*MB*	26922.021		
3706.598	6	*MB*	26971.243			3713.463	30	*MB*	26921.383	$4844°_{1\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−81
3706.932	90	*MB*	26968.813	$4201°_{1\frac{1}{2}} - 31170_{1\frac{1}{2}}$	61	3713.583	2	*MB*	26920.513		
3706.981	9	*MB*	26968.456	$4266°_{3\frac{1}{2}} - 31234_{2\frac{1}{2}}$	−25	3713.627	4	*MB*	26920.194		
3707.163	12	*MB*	26967.132			3713.659	10	*MB*	26919.962	$5942°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−6
3707.398	70	*MB*	26965.423	$4165_{4\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	−9	3713.923	5	*MB*	26918.048	$7059°_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−19
3707.457	1	*MB*	26964.994			3713.993	40	*MB*	26917.541	$17976_{2\frac{1}{2}} - 44893°_{3\frac{1}{2}}$	15
3707.594	20	*MB*	26963.997	$1011{}^{4}°_{2\frac{1}{2}} - 37078_{1\frac{1}{2}}$	1					$987°_{4\frac{1}{2}} - 27905_{4\frac{1}{2}}$	−4
3707.667	9	*MB*	26963.466	$7202°_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	−43	3714.079	2	*MB*	26916.918	$8280°_{2\frac{1}{2}} - 35197_{1\frac{1}{2}}$	24
3707.696	10	*MB*	26963.256	$987°_{4\frac{1}{2}} - 27950_{5\frac{1}{2}}$	−23	3714.125	4	*MB*	26916.585		
3707.923	8	*MB*	26961.605			3714.191	1	*MB*	26916.106		
3708.260	1	*MB*	26959.155			3714.244	4	*MB*	26915.722		
3708.319	8	*MB*	26958.726			3714.522	10	*MB*	26913.708	$9198°_{3\frac{1}{2}} - 36112_{3\frac{1}{2}}$	13
3708.361	5	*MB*	26958.420			3714.633	10	*MB*	26912.904		
3708.518	8	*MB*	26957.279			3714.776	90	*MB*	26911.868	$8804°_{4\frac{1}{2}} - 35716_{5\frac{1}{2}}$	9
3708.747	3	*MB*	26955.615			3714.835	4	*MB*	26911.440		
3708.928	1	*MB*	26954.299			3715.138	30	*MB*	26909.245	$4459°_{3\frac{1}{2}} - 31369_{2\frac{1}{2}}$	25
3708.982	2	*MB*	26953.907			3715.368	2	*MB*	26907.580		
3709.082	3	*MB*	26953.180			3715.436	3	*MB*	26907.087		
3709.146	7	*MB*	26952.715	$7202°_{2\frac{1}{2}} - 34155_{3\frac{1}{2}}$	−66	3715.465	100	*MB*	26906.877	$6389°_{4\frac{1}{2}} - 33296_{4\frac{1}{2}}$	14
3709.285	850	*MB*	26951.705	$4203°_{6\frac{1}{2}} - 31155_{6\frac{1}{2}}$	16	3715.506	2	*MB*	26906.580		
3709.384	7	*MB*	26950.986			3715.601	6	*MB*	26905.892		
3709.412	3	*MB*	26950.782			3715.890	90	*MB*	26903.800		
3709.584	15	*MB*	26949.533	$7818°_{1\frac{1}{2}} - 34767_{1\frac{1}{2}}$	−10	3715.934	2	*MB*	26903.481		
3709.717	4	*MB*	26948.567			3716.078	1	*MB*	26902.439		
3709.926	850	*MB*	26947.049	$987°_{4\frac{1}{2}} - 27934_{4\frac{1}{2}}$	22	3716.154	2	*MB*	26901.888		
3709.965	8	*MB*	26946.765			3716.364	1100	*MB*	26900.368	$0°_{3\frac{1}{2}} - 26900_{3\frac{1}{2}}$	15
3710.159	2	*MB*	26945.356			3716.400	10	*MB*	26900.108		
3710.208	2	*MB*	26945.001	$7061°_{0\frac{1}{2}} - 34006_{0\frac{1}{2}}$	17	3716.707	9	*MB*	26897.886	$5964°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	15
3710.247	7	*MB*	26944.717	$8280°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	8	3716.933	90	*MB*	26896.250	$7259°_{3\frac{1}{2}} - 34155_{3\frac{1}{2}}$	15
3710.396	7	*MB*	26943.635	$8402°_{3\frac{1}{2}} - 35346_{3\frac{1}{2}}$	22	3716.970	2	*MB*	26895.983		
3710.548	3	*MB*	26942.532			3717.031	1	*MB*	26895.541		
3710.693	10	*MB*	26941.479	$4266°_{3\frac{1}{2}} - 31207_{3\frac{1}{2}}$	−50	3717.066	5	*MB*	26895.288		
3710.997	10	*MB*	26939.272	$9198°_{3\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−5	3717.133	6	*MB*	26894.803		
3711.305	7	*MB*	26937.036			3717.207	1	*MB*	26894.268		
3711.428	2	*MB*	26936.144	$5924°_{1\frac{1}{2}} - 32860_{0\frac{1}{2}}$	−4	3717.289	3	*MB*	26893.675		
3711.479	1	*MB*	26935.773			3717.397	2	*MB*	26892.893		
3711.787	10	*MB*	26933.538	$3703°_{3\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−24	3717.482	60	*MB*	26892.279	$6517°_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	1
3711.829	1	*MB*	26933.234			3717.525	1	*MB*	26891.967		
3711.906	3	*MB*	26932.675			3717.564	6	*MB*	26891.685	$3745°_{1\frac{1}{2}} - 30637_{2\frac{1}{2}}$	4
3711.948	4	*MB*	26932.370			3717.619	6	*MB*	26891.287		
3712.097	8	*MB*	26931.289	$10684°_{0\frac{1}{2}} - 37615_{0\frac{1}{2}}$	−3	3717.699	2	*MB*	26890.709		
3712.368	1	*MB*	26929.323			3717.822	3	*MB*	26889.819		
3712.547	5	*MB*	26928.025			3718.064	10	*MB*	26888.069	$10035°_{5\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−8
										$10454°_{1\frac{1}{2}} - 37342_{2\frac{1}{2}}$	14
3712.718	7	*MB*	26926.785	$5010°_{2\frac{1}{2}} - 31937_{3\frac{1}{2}}$	2						
3712.767	2	*MB*	26926.429			3718.185	340	*MB*	26887.194	$1410°_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	25
3712.817	2	*MB*	26926.067	$15803_{4\frac{1}{2}} - 42729°_{5\frac{1}{2}}$	−69	3718.227	3	*MB*	26886.890		
3712.961	7	*MB*	26925.023			3718.312	5	*MB*	26886.276		
3713.043	7	*MB*	26924.428	$1410°_{4\frac{1}{2}} - 28334_{4\frac{1}{2}}$	−23	3718.380	340	*WA*	26885.784	$4203°_{6\frac{1}{2}} - 31089_{5\frac{1}{2}}$	−12

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3718.413	9	*MB*	26885.545			3724.522	8	*MB*	26841.449	$0^{\circ}_{3\,1/2}-26841_{4\,1/2}$	65
3718.454	9	*MB*	26885.249	$4322^{\circ}_{2\,1/2}-31207_{3\,1/2}$	30	3724.640	120	*MB*	26840.598	$5010^{\circ}_{2\,1/2}-31851_{2\,1/2}$	72
3718.651	1	*MB*	26883.825			3724.722	4	*MB*	26840.007		
3718.690	3	*MB*	26883.543	$11949^{\circ}_{3\,1/2}-38832_{2\,1/2}$	23	3724.876	1	*MB*	26838.898		
3718.818	7	*MB*	26882.618	$9634^{\circ}_{1\,1/2}-36516_{1\,1/2}$	6	3724.901	3	*MB*	26838.718		
3718.965	8	*MB*	26881.555			3725.323	3	*MB*	26835.678		
3719.080	10	*MB*	26880.724	$12057^{\circ}_{2\,1/2}-38937_{1\,1/2}$	15	3725.394	5	*MB*	26835.166		
				$5437^{\circ}_{3\,1/2}-32318_{3\,1/2}$	−28	3725.515	1	*MB*	26834.295		
3719.171	6	*MB*	26880.066	$8927^{\circ}_{5\,1/2}-35807_{4\,1/2}$	12	3725.604	10	*MB*	26833.654	$3995^{\circ}_{3\,1/2}-30829_{3\,1/2}$	−9
3719.272	3	*MB*	26879.336			3725.667	340	*MB*	26833.200	$5969^{\circ}_{5\,1/2}-32802_{5\,1/2}$	42
3719.435	10	*MB*	26878.158			3725.772	4	*MB*	26832.444		
3719.469	2	*MB*	26877.913			3725.861	2	*MB*	26831.803		
3719.516	8	*MB*	26877.573			3726.359	1	*MB*	26828.217		
3719.669	4	*MB*	26876.468			3726.456	12	*MB*	26827.518	$4910^{\circ}_{5\,1/2}-31738_{5\,1/2}$	−2
3719.792	170	*MB*	26875.579	$2563^{\circ}_{5\,1/2}-29438_{5\,1/2}$	−4	3726.611	4	*MB*	26826.403	$13012^{\circ}_{2\,1/2}-39838_{2\,1/2}$	53
3719.828	5	*MB*	26875.319			3726.654	1	*MB*	26826.093		
3719.919	7	*MB*	26874.661			3726.959	140	*MB*	26823.898	$987^{\circ}_{4\,1/2}-27811_{3\,1/2}$	13
3719.969	10	*MB*	26874.300			3727.113	5	*MB*	26822.790		
3720.006	2	*MB*	26874.033			3727.248	5	*MB*	26821.818		
3720.299	6	*MB*	26871.916			3727.326	12	*MB*	26821.257	$4737^{\circ}_{2\,1/2}-31558_{3\,1/2}$	4
3720.567	12	*MB*	26869.981			3727.664	12	*MB*	26818.825	$5118^{\circ}_{2\,1/2}-31937_{3\,1/2}$	−21
3720.695	3	*MB*	26869.056			3727.905	10	*MB*	26817.091		
3721.003	2	*MB*	26866.832			3728.017	400	*MB*	26816.286	$5675^{\circ}_{4\,1/2}-32492_{5\,1/2}$	11
3721.327	7	*MB*	26864.493			3728.064	10	*MB*	26815.948	$7092_{5\,1/2}-33908^{\circ}_{4\,1/2}$	20
3721.397	6	*MB*	26863.988			3728.178	90	*MB*	26815.128	$2634^{\circ}_{2\,1/2}-29449_{1\,1/2}$	16
3721.525	1	*MB*	26863.064			3728.229	1	*MB*	26814.761		
3721.658	3	*MB*	26862.104			3728.328	10	*MB*	26814.049		
3721.775	1	*MB*	26861.259			3728.414	650	*MB*	26813.430	$5455^{\circ}_{7\,1/2}-32269_{7\,1/2}$	24
3721.798	2	*MB*	26861.094			3728.456	12	*MB*	26813.128		
3721.917	2	*MB*	26860.235	$11949^{\circ}_{3\,1/2}-38809_{3\,1/2}$	−51	3728.729	12	*MB*	26811.165		
3721.951	4	*MB*	26859.989	$6549^{\circ}_{2\,1/2}-33409_{3\,1/2}$	1	3728.772	7	*MB*	26810.856	$7233^{\circ}_{5\,1/2}-34044_{4\,1/2}$	42
3722.101	50	*MB*	26858.907	$5513_{5\,1/2}-32372^{\circ}_{4\,1/2}$	−4	3729.001	40	*MB*	26809.210	$4266^{\circ}_{3\,1/2}-31075_{4\,1/2}$	4
3722.284	120	*MB*	26857.587	$2581^{\circ}_{4\,1/2}-29438_{5\,1/2}$	27	3729.191	6	*MB*	26807.844		
3722.762	90	*MB*	26854.138	$2595^{\circ}_{1\,1/2}-29449_{1\,1/2}$	4	3729.322	1	*MB*	26806.902		
3722.835	3	*MB*	26853.611	$10798^{\circ}_{2\,1/2}-37652_{2\,1/2}$	76	3729.424	2	*MB*	26806.169		
3722.981	1	*MB*	26852.558			3729.570	3	*MB*	26805.120		
3723.055	3	*MB*	26852.025			3729.707	8	*MB*	26804.135		
3723.109	4	*MB*	26851.635	$8774_{4\,1/2}-35625^{\circ}_{3\,1/2}$	0	3729.916	60	*MB*	26802.633	$3363^{\circ}_{2\,1/2}-30166_{3\,1/2}$	3
3723.165	3	*MB*	26851.232	$1873^{\circ}_{3\,1/2}-28725_{4\,1/2}$	18	3730.116	2	*MB*	26801.196		
3723.289	4	*MB*	26850.337			3730.268	8	*MB*	26800.104	$13675_{2\,1/2}-40475^{\circ}_{3\,1/2}$	−98
3723.457	2	*MB*	26849.126			3730.338	110	*MB*	26799.601	$11742^{\circ}_{5\,1/2}-38541_{4\,1/2}$	−26
3723.628	35	*MB*	26847.893	$4322^{\circ}_{2\,1/2}-31170_{1\,1/2}$	−43	3730.441	2	*MB*	26798.861		
3723.796	2	*MB*	26846.682			3730.601	5	*MB*	26797.712		
3723.859	5	*MB*	26846.227	$10684^{\circ}_{0\,1/2}-37530_{1\,1/2}$	36	3730.655	12	*MB*	26797.324		
3723.917	1	*MB*	26845.809			3730.747	8	*MB*	26796.663	$11007^{\circ}_{1\,1/2}-37804_{1\,1/2}$	28
3723.946	1	*MB*	26845.600			3730.849	1	*MB*	26795.931		
3724.209	9	*MB*	26843.704			3730.896	1	*MB*	26795.593		
3724.284	8	*MB*	26843.164			3731.110	15	*MB*	26794.056		
3724.383	3	*MB*	26842.451			3731.332	3	*MB*	26792.462	$5924^{\circ}_{1\,1/2}-32716_{2\,1/2}$	19
3724.437	4	*MB*	26842.061			3731.439	4	*MB*	26791.694		

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3731.685	12	*MB*	26789.928	$10798°_{2\frac{1}{2}} - 37588_{3\frac{1}{2}}$	10	3737.967	10	*MB*	26744.906	$20714_{2\frac{1}{2}} - 47459°_{2\frac{1}{2}}$	−28
3731.873	90	*MB*	26788.578	$8927°_{5\frac{1}{2}} - 35716_{5\frac{1}{2}}$	9					$8175°_{2\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−18
3731.977	2	*MB*	26787.831			3738.076	7	*MB*	26744.126		
3732.180	10	*MB*	26786.374			3738.362	1	*MB*	26742.080		
3732.318	7	*MB*	26785.384	$7259°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	18	3738.574	1	*MB*	26740.564		
3732.432	5	*MB*	26784.566			3738.735	2	*MB*	26739.412		
3732.460	80	*MB*	26784.365	$2382°_{4\frac{1}{2}} - 29166_{4\frac{1}{2}}$	14	3738.844	6	*MB*	26738.632		
3732.580	25	*WA*	26783.504	$2581°_{4\frac{1}{2}} - 29364_{3\frac{1}{2}}$	21	3738.871	4	*MB*	26738.440	$12097_{3\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	−17
3732.942	2	*MB*	26780.907			3738.995	4	*MB*	26737.553	$5675°_{4\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−29
3732.986	3	*MB*	26780.591			3739.116	1	*MB*	26736.688		
3733.006	4	*MB*	26780.448			3739.222	1	*MB*	26735.930		
3733.092	10	*MB*	26779.831			3739.265	1	*MB*	26735.622		
3733.230	2	*MB*	26778.841	$10114°_{2\frac{1}{2}} - 36893_{3\frac{1}{2}}$	−45	3739.528	2	*MB*	26733.742		
3733.440	1	*MB*	26777.335			3739.690	10	*MB*	26732.584	$5118°_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	−6
3733.524	120	*MB*	26776.732	$4266°_{3\frac{1}{2}} - 31043_{2\frac{1}{2}}$	19	3739.763	7	*MB*	26732.062	$10798°_{2\frac{1}{2}} - 37530_{1\frac{1}{2}}$	−15
3733.567	4	*MB*	26776.424			3740.017	2	*MB*	26730.247	$8131_{4\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	−61
3733.680	3	*MB*	26775.613	$12057°_{2\frac{1}{2}} - 38832_{2\frac{1}{2}}$	12	3740.044	9	*MB*	26730.054	$2634°_{2\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−19
3733.766	7	*MB*	26774.997	$4459°_{3\frac{1}{2}} - 31234_{2\frac{1}{2}}$	−9	3740.129	60	*MB*	26729.446	$10114°_{2\frac{1}{2}} - 36844_{2\frac{1}{2}}$	24
3733.816	4	*MB*	26774.638	$7202°_{2\frac{1}{2}} - 33977_{3\frac{1}{2}}$	27	3740.174	2	*MB*	26729.125		
3733.928	4	*MB*	26773.835	$5942°_{3\frac{1}{2}} - 32716_{2\frac{1}{2}}$	−13	3740.197	3	*MB*	26728.960		
3734.070	12	*MB*	26772.817	$7522°_{5\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−11	3740.288	1	*MB*	26728.310		
3734.295	1	*MB*	26771.204			3740.413	9	*MB*	26727.417	$9198°_{3\frac{1}{2}} - 35925_{3\frac{1}{2}}$	61
3734.534	1	*MB*	26769.491			3740.577	10	*MB*	26726.245	$13784°_{1\frac{1}{2}} - 40511_{1\frac{1}{2}}$	−47
3734.585	6	*MB*	26769.125			3740.621	1	*MB*	26725.931		
3735.145	2	*MB*	26765.112			3740.738	1	*MB*	26725.095		
3735.196	1	*MB*	26764.746	$8169°_{1\frac{1}{2}} - 34934_{2\frac{1}{2}}$	22	3740.786	4	*MB*	26724.752		
3735.254	2	*MB*	26764.331			3740.856	5	*MB*	26724.252		
3735.307	3	*MB*	26763.951			3741.007	60	*MB*	26723.173	$2641°_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−7
3735.449	2	*MB*	26762.934			3741.183	15	*MB*	26721.916		
3735.642	10	*MB*	26761.551			3741.205	10	*MB*	26721.759	$3703°_{3\frac{1}{2}} - 30425_{2\frac{1}{2}}$	4
3735.779	10	*MB*	26760.569	$5437°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	10	3741.394	15	*MB*	26720.409	$4322°_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	7
3735.911	9	*MB*	26759.624	$4201°_{1\frac{1}{2}} - 30961_{1\frac{1}{2}}$	0	3741.440	7	*MB*	26720.080		
3735.960	7	*MB*	26759.273			3741.721	60	*MB*	26718.074	$7259°_{3\frac{1}{2}} - 33977_{3\frac{1}{2}}$	9
3735.997	6	*MB*	26759.008			3741.764	2	*MB*	26717.767		
3736.057	10	*MB*	26758.578	$8175°_{2\frac{1}{2}} - 34934_{2\frac{1}{2}}$	19	3741.828	1	*MB*	26717.310		
3736.358	15	*MB*	26756.423			3741.881	1	*MB*	26716.931		
3736.432	12	*MB*	26755.893	$5616_{4\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	11	3742.122	1	*MB*	26715.211	$20714_{2\frac{1}{2}} - 47430°_{3\frac{1}{2}}$	−13
3736.524	7	*MB*	26755.234	$5010°_{2\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−4	3742.301	8	*MB*	26713.933	$5924°_{1\frac{1}{2}} - 32638_{1\frac{1}{2}}$	−27
3736.573	7	*MB*	26754.883	$8702°_{1\frac{1}{2}} - 35457_{1\frac{1}{2}}$	10	3742.602	1	*MB*	26711.785		
3736.741	3	*MB*	26753.680			3742.664	3	*MB*	26711.342		
3736.831	1	*MB*	26753.036			3742.853	4	*MB*	26709.993		
3736.908	20	*MB*	26752.485	$13758°_{1\frac{1}{2}} - 40511_{1\frac{1}{2}}$	28	3742.923	7	*MB*	26709.494		
				$7059°_{4\frac{1}{2}} - 33811_{4\frac{1}{2}}$	−9	3743.125	6	*MB*	26708.052		
3737.011	10	*MB*	26751.747	$5964°_{3\frac{1}{2}} - 32716_{2\frac{1}{2}}$	−3	3743.171	3	*MB*	26707.724		
3737.342	1	*MB*	26749.378			3743.254	10	*MB*	26707.132	$3995°_{3\frac{1}{2}} - 30702_{4\frac{1}{2}}$	−17
3737.412	80	*MB*	26748.877	$8278_{5\frac{1}{2}} - 35026°_{4\frac{1}{2}}$	−12	3743.359	8	*MB*	26706.383		
3737.464	3	*MB*	26748.505			3743.579	5	*MB*	26704.814		
3737.526	90	*MB*	26748.061	$4459°_{3\frac{1}{2}} - 31207_{3\frac{1}{2}}$	7	3743.662	3	*MB*	26704.221		
3737.732	130	*MB*	26746.587	$6913°_{6\frac{1}{2}} - 33659_{5\frac{1}{2}}$	12	3743.780	2	*MB*	26703.380		
3737.838	1	*MB*	26745.829			3743.802	1	*MB*	26703.223		

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3744.014	10	MB	26701.711	$3363°_{2\frac{1}{2}} - 30065_{3\frac{1}{2}}$	−25	3749.964	7	MB	26659.345	$4511°_{2\frac{1}{2}} - 31170_{1\frac{1}{2}}$	−42
3744.076	40	MB	26701.269	$5437°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−6	3750.072	140	MB	26658.577	$6638°_{4\frac{1}{2}} - 33296_{4\frac{1}{2}}$	30
3744.212	1	MB	26700.299			3750.122	3	MB	26658.222		
3744.286	2	MB	26699.771			3750.178	5	MB	26657.824		
3744.381	1	MB	26699.094			3750.290	8	MB	26657.027	$4910°_{5\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−28
3744.438	2	MB	26698.687			3750.454	8	MB	26655.862	$6521°_{1\frac{1}{2}} - 33177_{0\frac{1}{2}}$	−1
3744.659	10	MB	26697.112	$5716°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−17	3750.494	3	MB	26655.577		
3744.847	1	MB	26695.771			3750.650	5	MB	26654.469	$9634°_{1\frac{1}{2}} - 36288_{0\frac{1}{2}}$	−3
3744.908	2	MB	26695.337			3750.716	12	MB	26654.000		
3745.093	6	MB	26694.018			3750.910	2	MB	26652.621		
3745.162	6	MB	26693.526			3750.998	120	MB	26651.996	$3593°_{4\frac{1}{2}} - 30245_{4\frac{1}{2}}$	0
3745.349	6	MB	26692.194			3751.043	3	MB	26651.676		
3745.605	1	MB	26690.369			3751.115	3	MB	26651.165		
3745.657	4	MB	26689.999			3751.212	9	MB	26650.476		
3745.769	1	MB	26689.201			3751.376	10	MB	26649.311		
3745.921	2	MB	26688.118			3751.441	200	MB	26648.849	$10274°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	31
3746.049	3	MB	26687.206			3751.487	7	MB	26648.522		
3746.102	5	MB	26686.828			3751.551	10	MB	26648.068	$11325°_{2\frac{1}{2}} - 37973_{3\frac{1}{2}}$	73
3746.259	50	MB	26685.710	$2595°_{1\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−19	3751.592	10	MB	26647.776		
3746.376	140	MB	26684.877	$4523°_{4\frac{1}{2}} - 31207_{3\frac{1}{2}}$	−16	3751.667	1	MB	26647.244	$5118°_{2\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−58
3746.478	2	MB	26684.150			3751.744	30	MB	26646.697	$2634°_{2\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−10
3746.770	2	MB	26682.070			3751.860	6	MB	26645.873		
3746.871	2	MB	26681.351			3751.956	2	MB	26645.191		
3747.081	7	MB	26679.856	$7746°_{2\frac{1}{2}} - 34426_{2\frac{1}{2}}$	4	3752.084	4	MB	26644.282	$11007°_{1\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−9
				$3745°_{1\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−17	3752.191	12	MB	26643.522	$8169°_{1\frac{1}{2}} - 34813_{2\frac{1}{2}}$	19
3747.147	2	MB	26679.386			3752.251	1	MB	26643.096		
3747.174	2	MB	26679.194			3752.350	110	MB	26642.393	$5675°_{4\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−18
3747.284	1	MB	26678.411			3752.448	10	MB	26641.698	$3995°_{3\frac{1}{2}} - 30637_{2\frac{1}{2}}$	1
3747.342	1	MB	26677.998			3752.498	2	MB	26641.343		
3747.770	6	MB	26674.951	$17976_{2\frac{1}{2}} - 44651°_{1\frac{1}{2}}$	61	3752.571	10	MB	26640.824		
3747.931	8	MB	26673.805	$7202°_{2\frac{1}{2}} - 33876_{1\frac{1}{2}}$	−42	3752.714	10	MB	26639.809	$8280°_{2\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−32
3747.959	4	MB	26673.606							$2641°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−5
3748.056	260	MB	26672.916	$5819°_{4\frac{1}{2}} - 32492_{5\frac{1}{2}}$	−8	3752.857	9	MB	26638.794	$4322°_{2\frac{1}{2}} - 30961_{1\frac{1}{2}}$	−15
3748.161	3	MB	26672.169			3753.114	1	MB	26636.970		
3748.277	7	MB	26671.287			3753.242	3	MB	26636.062		
3748.341	9	MB	26670.888			3753.654	4	MB	26633.138	$11340°_{3\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−39
3748.486	1	MB	26669.856			3753.763	60	MB	26632.365	$12762°_{4\frac{1}{2}} - 39394_{3\frac{1}{2}}$	13
3748.558	1	MB	26669.344			3753.854	3	MB	26631.719	$4737°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	0
3748.628	2	MB	26668.846			3753.962	5	MB	26630.953	$6517°_{2\frac{1}{2}} - 33148_{2\frac{1}{2}}$	−16
3748.755	8	MB	26667.942			3754.052	4	MB	26630.315		
3748.832	2	MB	26667.395			3754.214	5	MB	26629.165		
3748.967	1	MB	26666.434			3754.294	5	MB	26628.598		
3749.036	6	MB	26665.944			3754.484	15	MB	26627.251	$6521°_{1\frac{1}{2}} - 33148_{2\frac{1}{2}}$	−5
3749.102	5	MB	26665.474			3754.591	4	MB	26626.492		
3749.156	7	MB	26665.090			3754.634	1	MB	26626.187		
3749.365	12	MB	26663.604	$10924°_{4\frac{1}{2}} - 37588_{3\frac{1}{2}}$	7	3754.761	6	MB	26625.286		
3749.624	3	MB	26661.762			3755.038	10	MB	26623.322		
3749.662	6	MB	26661.492			3755.213	5	MB	26622.082		
3749.705	1	MB	26661.186			3755.272	2	MB	26621.663		
3749.742	1	MB	26660.923			3755.415	160	MB	26620.650	$3363°_{2\frac{1}{2}} - 29984_{1\frac{1}{2}}$	25

501-968 O - 73 - 7

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3755.684	9	*MB*	26618.743	$10274°_{3\frac{1}{2}}-36893_{3\frac{1}{2}}$	−55	3761.913	4	*MB*	26574.668		
3755.716	140	*MB*	26618.516	$5616_{4\frac{1}{2}}-32235°_{3\frac{1}{2}}$	16	3761.940	10	*MB*	26574.478		
3755.789	15	*MB*	26617.999	$6913°_{6\frac{1}{2}}-33531_{6\frac{1}{2}}$	3	3762.084	3	*MB*	26573.461		
3755.931	1	*MB*	26616.993			3762.210	7	*MB*	26572.571	$12260°_{3\frac{1}{2}}-38832_{2\frac{1}{2}}$	−49
3755.984	2	*MB*	26616.617			3762.280	3	*WA*	26572.076	$9053_{3\frac{1}{2}}-35625°_{3\frac{1}{2}}$	6
3756.065	1	*MB*	26616.043			3762.335	3	*MB*	26571.688		
3756.114	3	*MB*	26615.696	$4459°_{3\frac{1}{2}}-31075_{4\frac{1}{2}}$	−34	3762.408	2	*MB*	26571.172		
3757.030	4	*MB*	26609.207	$9198°_{3\frac{1}{2}}-35807_{4\frac{1}{2}}$	−34	3762.577	3	*MB*	26569.979		
3757.214	130	*MB*	26607.904	$11007°_{1\frac{1}{2}}-37615_{0\frac{1}{2}}$	−30	3762.671	4	*MB*	26569.315	$10274°_{3\frac{1}{2}}-36844_{2\frac{1}{2}}$	−18
				$7818°_{1\frac{1}{2}}-34426_{2\frac{1}{2}}$	14	3762.720	4	*MB*	26568.969		
3757.496	20	*MB*	26605.907	$19982_{4\frac{1}{2}}-46588°_{5\frac{1}{2}}$	−36	3762.761	1	*MB*	26568.680		
3757.700	5	*MB*	26604.462			3762.971	240	*MB*	26567.197	$7341_{5\frac{1}{2}}-33908°_{4\frac{1}{2}}$	11
3757.799	6	*MB*	26603.762			3763.261	5	*MB*	26565.150		
3757.856	130	*MB*	26603.358	$2563°_{5\frac{1}{2}}-29166_{4\frac{1}{2}}$	−5	3763.314	1	*MB*	26564.776		
3758.057	6	*MB*	26601.935	$5716°_{3\frac{1}{2}}-32318_{3\frac{1}{2}}$	−23	3763.334	10	*MB*	26564.634		
3758.203	12	*MB*	26600.902	$7059°_{4\frac{1}{2}}-33659_{5\frac{1}{2}}$	6	3763.429	3	*MB*	26563.964		
3758.442	1	*MB*	26599.210			3763.605	70	*MB*	26562.722	$4266°_{3\frac{1}{2}}-30829_{3\frac{1}{2}}$	−4
3758.474	5	*MB*	26598.984			3763.722	12	*MB*	26561.896	$6517°_{2\frac{1}{2}}-33079_{3\frac{1}{2}}$	3
3758.521	12	*MB*	26598.651	$6549°_{2\frac{1}{2}}-33148_{2\frac{1}{2}}$	−29	3764.115	550	*MB*	26559.123	$2879°_{5\frac{1}{2}}-29438_{5\frac{1}{2}}$	1
3758.687	10	*MB*	26597.476	$7278°_{1\frac{1}{2}}-33876_{1\frac{1}{2}}$	22	3764.226	4	*MB*	26558.340		
3758.943	1	*MB*	26595.665			3764.312	2	*MB*	26557.733		
3758.990	1	*MB*	26595.333			3764.403	10	*MB*	26557.091		
3759.016	2	*MB*	26595.149			3764.540	4	*MB*	26556.125		
3759.082	2	*MB*	26594.682			3764.613	12	*MB*	26555.610	$18393_{3\frac{1}{2}}-44949°_{4\frac{1}{2}}$	−73
3759.149	12	*MB*	26594.208	$5819°_{4\frac{1}{2}}-32413_{3\frac{1}{2}}$	−24	3764.650	10	*MB*	26555.348		
3759.230	8	*MB*	26593.635			3764.701	2	*MB*	26554.989		
3759.258	2	*MB*	26593.437			3764.809	1	*MB*	26554.227		
3759.291	3	*MB*	26593.203			3764.895	2	*MB*	26553.620		
3759.311	3	*MB*	26593.062			3765.044	160	*MB*	26552.570	$4523°_{4\frac{1}{2}}-31075_{4\frac{1}{2}}$	0
3759.365	3	*MB*	26592.680	$11949°_{3\frac{1}{2}}-38541_{4\frac{1}{2}}$	−3	3765.111	1	*MB*	26552.097		
3759.439	4	*MB*	26592.156			3765.155	2	*MB*	26551.787		
3759.486	2	*MB*	26591.824	$8175°_{2\frac{1}{2}}-34767_{1\frac{1}{2}}$	−3	3765.246	5	*MB*	26551.145		
3759.607	4	*MB*	26590.968	$10641°_{2\frac{1}{2}}-37232_{1\frac{1}{2}}$	−27	3765.276	1	*MB*	26550.934		
3759.657	3	*MB*	26590.614			3765.416	5	*MB*	26549.946		
3759.888	1	*MB*	26588.981			3765.521	4	*MB*	26549.206	$7259°_{3\frac{1}{2}}-33808_{2\frac{1}{2}}$	−35
3760.130	3	*MB*	26587.270			3765.639	1	*MB*	26548.374		
3760.178	7	*MB*	26586.930	$7746°_{2\frac{1}{2}}-34333_{2\frac{1}{2}}$	17	3765.737	6	*MB*	26547.683	$7878°_{3\frac{1}{2}}-34426_{2\frac{1}{2}}$	−25
3760.313	2	*MB*	26585.976	$11387°_{3\frac{1}{2}}-37973_{3\frac{1}{2}}$	−68	3765.804	4	*MB*	26547.211		
3760.404	40	*MB*	26585.332	$2581°_{4\frac{1}{2}}-29166_{4\frac{1}{2}}$	−7	3765.889	70	*MB*	26546.612	$5651°_{5\frac{1}{2}}-32197_{4\frac{1}{2}}$	−12
3760.532	2	*MB*	26584.427			3765.946	10	*MB*	26546.210		
3760.673	5	*MB*	26583.431	$8278_{5\frac{1}{2}}-34861°_{5\frac{1}{2}}$	−40	3766.167	1	*MB*	26544.652		
3760.701	60	*MB*	26583.233	$4459°_{3\frac{1}{2}}-31043_{2\frac{1}{2}}$	−4	3766.261	2	*MB*	26543.990		
3760.826	6	*MB*	26582.349	$7713°_{4\frac{1}{2}}-34295_{4\frac{1}{2}}$	−11	3766.293	5	*MB*	26543.764	$10798°_{2\frac{1}{2}}-37342_{2\frac{1}{2}}$	−7
3761.103	3	*MB*	26580.392			3766.350	4	*MB*	26543.363	$4201°_{1\frac{1}{2}}-30745_{1\frac{1}{2}}$	−29
3761.185	10	*MB*	26579.812	$11949°_{3\frac{1}{2}}-38529_{2\frac{1}{2}}$	−19	3766.392	3	*MB*	26543.067		
3761.308	6	*MB*	26578.943			3766.506	80	*MB*	26542.263	$3703°_{3\frac{1}{2}}-30245_{4\frac{1}{2}}$	−20
3761.467	3	*MB*	26577.819			3766.535	50	*MB*	26542.059	$8804°_{4\frac{1}{2}}-35346_{3\frac{1}{2}}$	1
3761.527	1	*MB*	26577.396			3766.684	15	*MB*	26541.009	$3593°_{4\frac{1}{2}}-30134_{5\frac{1}{2}}$	−18
3761.705	2	*MB*	26576.138			3766.739	7	*MB*	26540.622	$1410°_{4\frac{1}{2}}-27950_{5\frac{1}{2}}$	35
3761.791	2	*MB*	26575.530			3766.950	2	*MB*	26539.135		

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3766.981	1	*MB*	26538.917			3773.200	70	*MB*	26495.176	$6549°_{2\frac{1}{2}}-33045_{2\frac{1}{2}}$	−10
3767.263	7	*MB*	26536.930			3773.246	50	*MB*	26494.853	$1410°_{4\frac{1}{2}}-27905_{4\frac{1}{2}}$	0
3767.561	8	*MB*	26534.831			3773.437	60	*MB*	26493.512	$5437°_{3\frac{1}{2}}-31930_{4\frac{1}{2}}$	−1
3767.870	10	*MB*	26532.655	$6517°_{2\frac{1}{2}}-33050_{1\frac{1}{2}}$	−16	3773.658	5	*MB*	26491.960		
3767.905	4	*MB*	26532.409			3773.880	30	*MB*	26490.402		
3767.928	9	*MB*	26532.247	$8280°_{2\frac{1}{2}}-34813_{2\frac{1}{2}}$	−8	3774.039	5	*MB*	26489.286	$20940_{3\frac{1}{2}}-47430°_{3\frac{1}{2}}$	−58
3767.996	40	*MB*	26531.768	$8402°_{3\frac{1}{2}}-34934_{2\frac{1}{2}}$	13	3774.339	2	*MB*	26487.181		
3768.079	10	*MB*	26531.183			3774.402	15	*MB*	26486.739	$8280°_{2\frac{1}{2}}-34767_{1\frac{1}{2}}$	−5
3768.235	1	*MB*	26530.085			3774.475	2	*MB*	26486.226		
3768.306	20	*MB*	26529.585	$6549°_{2\frac{1}{2}}-33079_{3\frac{1}{2}}$	−18	3774.737	1	*MB*	26484.388	$7522°_{0\frac{1}{2}}-34006_{0\frac{1}{2}}$	24
3768.333	5	*MB*	26529.395	$7278°_{1\frac{1}{2}}-33808_{2\frac{1}{2}}$	0	3774.928	5	*MB*	26483.048	$5283°_{0\frac{1}{2}}-31766_{1\frac{1}{2}}$	−31
3768.611	10	*MB*	26527.438	$6517°_{2\frac{1}{2}}-33045_{2\frac{1}{2}}$	−37	3775.030	2	*MB*	26482.333		
3768.673	9	*MB*	26527.002	$987°_{4\frac{1}{2}}-27514_{3\frac{1}{2}}$	−46	3775.115	5	*MB*	26481.736	$5716°_{3\frac{1}{2}}-32197_{4\frac{1}{2}}$	−29
3768.770	240	*MB*	26526.319	$8402°_{3\frac{1}{2}}-34928_{4\frac{1}{2}}$	18	3775.297	10	*MB*	26480.460		
3768.895	1	*MB*	26525.439			3775.355	25	*MB*	26480.053		
3769.044	80	*MB*	26524.391	$1410°_{4\frac{1}{2}}-27934_{4\frac{1}{2}}$	57	3775.558	30	*MB*	26478.629	$11325°_{2\frac{1}{2}}-37804_{1\frac{1}{2}}$	−23
				$4844°_{1\frac{1}{2}}-31369_{2\frac{1}{2}}$	−57	3775.832	2	*MB*	26476.708		
3769.129	4	*MB*	26523.793	$7011_{4\frac{1}{2}}-33535°_{3\frac{1}{2}}$	−38	3775.900	5	*MB*	26476.231		
				$6521°_{1\frac{1}{2}}-33045_{2\frac{1}{2}}$	30	3775.936	15	*MB*	26475.979		
3769.214	2	*MB*	26523.194	$8702°_{1\frac{1}{2}}-35225_{2\frac{1}{2}}$	−17	3775.997	25	*MB*	26475.551	$3508°_{0\frac{1}{2}}-29984_{1\frac{1}{2}}$	−30
3769.241	7	*MB*	26523.005	$5969°_{5\frac{1}{2}}-32492_{5\frac{1}{2}}$	−25	3776.145	60b	*MB*	26474.513	$15517°_{6\frac{1}{2}}-41992_{6\frac{1}{2}}$	−70
3769.267	10	*MB*	26522.822	$11007°_{1\frac{1}{2}}-37530_{1\frac{1}{2}}$	−11	3776.392	5	*MB*	26472.782	$6389°_{4\frac{1}{2}}-32862_{3\frac{1}{2}}$	−42
3769.358	9	*MB*	26522.181	$5675°_{4\frac{1}{2}}-32197_{4\frac{1}{2}}$	−37	3776.432	15	*MB*	26472.501		
3769.408	10	*MB*	26521.829	$7522°_{5\frac{1}{2}}-34044_{4\frac{1}{2}}$	10	3776.527	4	*MB*	26471.835	$12057°_{2\frac{1}{2}}-38529_{2\frac{1}{2}}$	−78
3769.553	1	*MB*	26520.809			3776.604	200	*MB*	26471.296	$3593°_{4\frac{1}{2}}-30065_{3\frac{1}{2}}$	14
3769.591	1	*MB*	26520.542			3776.715	50	*MB*	26470.518	$5942°_{3\frac{1}{2}}-32413_{3\frac{1}{2}}$	−29
3769.749	3	*MB*	26519.430							$4737°_{2\frac{1}{2}}-31207_{3\frac{1}{2}}$	−35
3769.844	2	*MB*	26518.762			3776.922	15	*MB*	26469.067		
3769.931	130	*MB*	26518.150	$8402°_{3\frac{1}{2}}-34920_{3\frac{1}{2}}$	31	3777.007	2	*MB*	26468.471		
3769.982	4	*MB*	26517.792			3777.046	5	*MB*	26468.198	$15565°_{2\frac{1}{2}}-42033_{2\frac{1}{2}}$	−36
3770.209	30	*MB*	26516.195			3777.240	5	*MB*	26466.838		
3770.386	30	*MB*	26514.950	$7818°_{1\frac{1}{2}}-34333_{2\frac{1}{2}}$	0	3777.663	110	*MB*	26463.875	$1873°_{3\frac{1}{2}}-28337_{2\frac{1}{2}}$	−4
3770.518	2	*MB*	26514.022			3778.037	25	*MB*	26461.255		
3770.763	170	*MB*	26512.299	$7061°_{0\frac{1}{2}}-33574_{1\frac{1}{2}}$	−7	3778.252	5	*MB*	26459.750		
3770.837	20	*MB*	26511.779			3778.406	2	*MB*	26458.671		
3770.996	2	*MB*	26510.661			3778.447	15	*MB*	26458.384		
3771.261	20	*MB*	26508.798	$8789_{2\frac{1}{2}}-35298°_{2\frac{1}{2}}$	−11	3778.585	10	*MB*	26457.418		
3771.383	25	*MB*	26507.941	$11340°_{3\frac{1}{2}}-37848_{2\frac{1}{2}}$	−10	3778.736	5	*MB*	26456.360		
3771.456	10	*MB*	26507.428			3778.759	10	*MB*	26456.200		
3771.600	240	*MB*	26506.416	$4322°_{2\frac{1}{2}}-30829_{3\frac{1}{2}}$	0	3778.963	12	*MB*	26454.771	$7878°_{3\frac{1}{2}}-34333_{2\frac{1}{2}}$	2
3771.864	2	*MB*	26504.560			3779.044	15	*MB*	26454.204		
3771.926	7	*MB*	26504.125	$4165_{4\frac{1}{2}}-30669°_{4\frac{1}{2}}$	−26	3779.260	2	*MB*	26452.692		
3772.028	30	*MB*	26503.408	$9634°_{1\frac{1}{2}}-36137_{2\frac{1}{2}}$	−9	3779.416	2	*MB*	26451.601		
3772.164	10	*MB*	26502.453			3779.606	35	*MB*	26450.271	$4511°_{2\frac{1}{2}}-30961_{1\frac{1}{2}}$	10
3772.294	10	*MB*	26501.539			3779.866	30	*MB*	26448.452	$5964°_{3\frac{1}{2}}-32413_{3\frac{1}{2}}$	2
3772.390	2	*MB*	26500.865			3780.137	2	*MB*	26446.555		
3772.464	30	*MB*	26500.345	$6549°_{2\frac{1}{2}}-33050_{1\frac{1}{2}}$	−37	3780.294	2	*MB*	26445.457		
3772.650	50	*MB*	26499.039	$5819°_{4\frac{1}{2}}-32318_{3\frac{1}{2}}$	−22	3780.554	30	*MB*	26443.638	$12365°_{4\frac{1}{2}}-38809_{3\frac{1}{2}}$	−31
3772.871	50	*MB*	26497.487	$4737°_{2\frac{1}{2}}-31234_{2\frac{1}{2}}$	−18					$3363°_{2\frac{1}{2}}-29807_{3\frac{1}{2}}$	−12
3772.919	7	*MB*	26497.149			3780.761	15	*MB*	26442.191	$7713°_{4\frac{1}{2}}-34155_{3\frac{1}{2}}$	−30

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3780.816	2	*MB*	26441.806			3789.838	20	*MB*	26378.861	$5819°_{4\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−7
3781.102	20	*MB*	26439.806	$5118°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−13	3789.925	2	*MB*	26378.255	$14097_{3\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	25
3781.260	15	*MB*	26438.701			3790.102	2	*MB*	26377.023		
3781.446	15	*MB*	26437.401	$10641°_{2\frac{1}{2}} - 37078_{1\frac{1}{2}}$	−35	3790.339	20	*MB*	26375.374	$5942°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−2
3781.616	500	*MB*	26436.213	$4266°_{3\frac{1}{2}} - 30702_{4\frac{1}{2}}$	0	3790.826	10	*MB*	26371.986		
3781.715	12	*MB*	26435.521			3790.882	50	*MB*	26371.596	$7202°_{2\frac{1}{2}} - 33574_{1\frac{1}{2}}$	−19
3781.743	10	*MB*	26435.325	$11759_{5\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	64	3791.007	15	*MB*	26370.727	$4266°_{3\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−32
				$4201°_{1\frac{1}{2}} - 30637_{2\frac{1}{2}}$	61	3791.103	20	*MB*	26370.059		
3781.978	30	*MB*	26433.682	$2595°_{1\frac{1}{2}} - 29029_{1\frac{1}{2}}$	−26	3791.221	20	*MB*	26369.238	$4459°_{3\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−13
3782.038	30	*MB*	26433.263	$4737°_{2\frac{1}{2}} - 31170_{1\frac{1}{2}}$	−8	3791.381	2	*MB*	26368.126		
3782.358	12	*MB*	26431.027	$3363°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−62	3791.682	70	*MB*	26366.032	$7293°_{6\frac{1}{2}} - 33659_{5\frac{1}{2}}$	3
3782.524	360	*MB*	26429.867	$3995°_{3\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−21	3792.110	2	*MB*	26363.057		
3782.758	2	*MB*	26428.232	$10088°_{1\frac{1}{2}} - 36516_{1\frac{1}{2}}$	74	3792.320	240	*MB*	26361.597	$3703°_{3\frac{1}{2}} - 30065_{3\frac{1}{2}}$	27
3783.031	80	*MB*	26426.325	$7233°_{5\frac{1}{2}} - 33659_{5\frac{1}{2}}$	−15	3792.486	15	*MB*	26360.443	$9198°_{3\frac{1}{2}} - 35558_{3\frac{1}{2}}$	67
3783.069	1	*MB*	26426.059	$12466°_{1\frac{1}{2}} - 38892_{0\frac{1}{2}}$	−11	3792.752	20	*MB*	26358.594	$9778°_{2\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−23
3783.296	10	*MB*	26424.473			3792.805	30	*MB*	26358.226	$5010°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	3
3783.431	30	*MB*	26423.531	$1873°_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−7	3792.966	2	*MB*	26357.107		
3783.579	160	*MB*	26422.497	$5716°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	15	3793.110	5	*MB*	26356.107		
3783.729	35	*MB*	26421.450			3793.421	50	*MB*	26353.946	$7522°_{0\frac{1}{2}} - 33876_{1\frac{1}{2}}$	27
3783.854	20	*MB*	26420.577			3793.513	80	*MB*	26353.307	$5964°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	28
3783.952	1	*MB*	26419.893	$7746°_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	39	3793.867	35b	*MB*	26350.848	$7059°_{4\frac{1}{2}} - 33409_{3\frac{1}{2}}$	23
3784.168	20	*MB*	26418.385			3793.980	7	*MB*	26350.063	$7202°_{2\frac{1}{2}} - 33552_{2\frac{1}{2}}$	10
3784.252	5	*MB*	26417.798			3794.212	25	*MB*	26348.452	$2382°_{4\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−13
3784.350	25	*MB*	26417.114	$7878°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−7	3794.294	15	*MB*	26347.882	$7818°_{1\frac{1}{2}} - 34166_{1\frac{1}{2}}$	−9
3784.593	15	*MB*	26415.418			3794.471	5	*MB*	26346.653		
3784.786	5	*MB*	26414.071	$5437°_{3\frac{1}{2}} - 31851_{2\frac{1}{2}}$	96	3794.529	2	*MB*	26346.251		
3785.116	5	*MB*	26411.768			3794.569	2	*MB*	26345.973		
3785.286	1	*MB*	26410.582	$8402°_{3\frac{1}{2}} - 34813_{2\frac{1}{2}}$	48	3794.680	80	*MB*	26345.202	$6517°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	54
3785.392	10	*MB*	26409.843			3795.011	150	*MB*	26342.905	$2382°_{4\frac{1}{2}} - 28725_{4\frac{1}{2}}$	3
3785.824	2	*MB*	26406.829			3795.076	20	*MB*	26342.453		
3785.856	5	*MB*	26406.606			3795.190	1	*MB*	26341.662	$7818°_{1\frac{1}{2}} - 34159_{0\frac{1}{2}}$	−67
3785.980	2	*MB*	26405.741			3795.246	140	*MB*	26341.274	$3793°_{6\frac{1}{2}} - 30134_{5\frac{1}{2}}$	−1
3786.536	25	*MB*	26401.864	$10114°_{2\frac{1}{2}} - 36516_{1\frac{1}{2}}$	−50	3795.472	2	*MB*	26339.705		
3786.628	700	*MB*	26401.222	$1410°_{4\frac{1}{2}} - 27811_{3\frac{1}{2}}$	30	3795.571	50	*MB*	26339.018	$6521°_{1\frac{1}{2}} - 32860_{0\frac{1}{2}}$	−2
3786.789	5	*MB*	26400.100			3795.767	10	*MB*	26337.658		
3787.460	30	*MB*	26395.423	$11742°_{5\frac{1}{2}} - 38137_{5\frac{1}{2}}$	−13	3795.802	5	*MB*	26337.415		
3787.567	80	*MB*	26394.677	$2634°_{2\frac{1}{2}} - 29029_{1\frac{1}{2}}$	−9	3795.927	5	*MB*	26336.548		
3787.905	100	*MB*	26392.322	$987°_{4\frac{1}{2}} - 27379_{5\frac{1}{2}}$	−15	3795.985	7	*MB*	26336.145		
3788.204	35	*MB*	26390.239	$5924°_{1\frac{1}{2}} - 32314_{0\frac{1}{2}}$	−25	3796.214	5	*MB*	26334.557	$11007°_{1\frac{1}{2}} - 37342_{2\frac{1}{2}}$	29
				$4844°_{1\frac{1}{2}} - 31234_{2\frac{1}{2}}$	4	3796.436	12	*MB*	26333.017	$9778°_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−17
3788.430	30	*MB*	26388.664	$9723°_{4\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−21	3796.675	40	*MB*	26331.359	$7713°_{4\frac{1}{2}} - 34044_{4\frac{1}{2}}$	8
3788.609	2	*MB*	26387.418			3797.127	5	*MB*	26328.225		
3788.656	12	*MB*	26387.090			3797.324	20	*MB*	26326.859	$14963°_{5\frac{1}{2}} - 41289_{5\frac{1}{2}}$	−11
3788.745	420	*MB*	26386.471	$3793°_{6\frac{1}{2}} - 30180_{6\frac{1}{2}}$	9	3797.404	10	*MB*	26326.304	$11325°_{2\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−5
3788.824	25	*MB*	26385.920			3797.451	2	*MB*	26325.979	$4844°_{1\frac{1}{2}} - 31170_{1\frac{1}{2}}$	−21
3789.118	3	*MB*	26383.873	$19481_{4\frac{1}{2}} - 45864°_{5\frac{1}{2}}$	−36	3797.604	10	*MB*	26324.918		
3789.183	2	*MB*	26383.421			3797.649	7	*MB*	26324.606		
3789.257	7	*MB*	26382.905	$13012°_{2\frac{1}{2}} - 39394_{3\frac{1}{2}}$	8	3797.801	10	*MB*	26323.553		
3789.376	7	*MB*	26382.077			3797.932	3	*MB*	26322.645	$13515°_{3\frac{1}{2}} - 39838_{2\frac{1}{2}}$	53
3789.598	5	*MB*	26380.531			3798.031	25	*MB*	26321.959		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3798.209	10	*MB*	26320.725			3807.860	5	*MB*	26254.017		
3798.279	7	*MB*	26320.240			3807.976	1	*MB*	26253.217		
3798.322	10	*MB*	26319.942			3808.032	10	*MB*	26252.831	$8774_{4\frac{1}{2}} - 35026^{\circ}_{4\frac{1}{2}}$	−48
3798.550	7	*MB*	26318.362			3808.110	850	*MB*	26252.293	$10641^{\circ}_{2\frac{1}{2}} - 36893_{3\frac{1}{2}}$	−34
3798.619	5	*MB*	26317.884	$4511^{\circ}_{2\frac{1}{2}} - 30829_{3\frac{1}{2}}$	17					$2382^{\circ}_{4\frac{1}{2}} - 28634_{5\frac{1}{2}}$	24
3798.822	20	*MB*	26316.478			3808.383	40	*MB*	26250.412	$3995^{\circ}_{3\frac{1}{2}} - 30245_{4\frac{1}{2}}$	−5
3799.035	80	*MB*	26315.002	$3593^{\circ}_{4\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−19	3808.649	25	*MB*	26248.578	$3745^{\circ}_{1\frac{1}{2}} - 29994_{2\frac{1}{2}}$	12
3799.341	10	*MB*	26312.883	$6549^{\circ}_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	24	3808.773	2	*MB*	26247.724		
3799.543	20	*MB*	26311.484	$11340^{\circ}_{3\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−8	3808.908	10	*MB*	26246.793		
3799.619	5	*MB*	26310.958			3809.214	400	*MB*	26244.685	$4910^{\circ}_{5\frac{1}{2}} - 31155_{6\frac{1}{2}}$	25
3799.899	10	*MB*	26309.019			3809.496	60	*MB*	26242.742	$4459^{\circ}_{3\frac{1}{2}} - 30702_{4\frac{1}{2}}$	5
3799.939	1	*MB*	26308.742	$9316_{3\frac{1}{2}} - 35625^{\circ}_{3\frac{1}{2}}$	−45	3809.771	5	*MB*	26240.848		
3800.164	10	*MB*	26307.185			3810.023	7	*MB*	26239.112		
3800.203	5	*MB*	26306.915			3810.099	30	*MB*	26238.589	$3745^{\circ}_{1\frac{1}{2}} - 29984_{1\frac{1}{2}}$	12
3800.326	100	*MB*	26306.063	$4523^{\circ}_{4\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−27	3810.226	25	*MB*	26237.715	$7059^{\circ}_{4\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−17
3800.372	75	*MB*	26305.745	$4737^{\circ}_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	8	3810.262	20	*MB*	26237.467	$7293^{\circ}_{6\frac{1}{2}} - 33531_{6\frac{1}{2}}$	17
3800.491	5	*MB*	26304.921			3810.369	12	*MB*	26236.730		
3800.714	7	*MB*	26303.378			3810.568	5	*MB*	26235.360		
3800.743	12	*MB*	26303.177			3810.624	1	*MB*	26234.974		
3801.520	2000	*MB*	26297.801	$7233^{\circ}_{5\frac{1}{2}} - 33531_{6\frac{1}{2}}$	40	3810.727	20	*MB*	26234.265		
3802.143	10	*MB*	26293.492	$7259^{\circ}_{3\frac{1}{2}} - 33552_{2\frac{1}{2}}$	−14	3810.770	1	*MB*	26233.969	$4511^{\circ}_{2\frac{1}{2}} - 30745_{1\frac{1}{2}}$	−59
3802.321	75	*MB*	26292.261	$25766^{\circ}_{4\frac{1}{2}} - 52058_{4\frac{1}{2}}$	30	3810.895	80	*MB*	26233.109	$5964^{\circ}_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	23
3802.593	30	*MB*	26290.381	$3703^{\circ}_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	−65	3811.211	7	*MB*	26230.934	$7746^{\circ}_{2\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−20
3802.801	15	*MB*	26288.943	$7522^{\circ}_{5\frac{1}{2}} - 33811_{4\frac{1}{2}}$	−2	3811.405	7	*MB*	26229.599	$17851^{\circ}_{0\frac{1}{2}} - 44081_{1\frac{1}{2}}$	24
3803.086	650	*MB*	26286.973	$2879^{\circ}_{5\frac{1}{2}} - 29166_{4\frac{1}{2}}$	71	3811.495	25	*MB*	26228.979	$5969^{\circ}_{5\frac{1}{2}} - 32197_{4\frac{1}{2}}$	5
3803.261	5	*MB*	26285.763			3811.595	50	*MB*	26228.291	$11742^{\circ}_{5\frac{1}{2}} - 37970_{5\frac{1}{2}}$	4
3803.327	7	*MB*	26285.307			3811.790	5	*MB*	26226.949		
3803.431	20	*MB*	26284.588			3812.149	20	*MB*	26224.479	$6638^{\circ}_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−29
3803.620	10	*MB*	26283.282			3812.204	200	*MB*	26224.101	$4737^{\circ}_{2\frac{1}{2}} - 30961_{1\frac{1}{2}}$	−43
3803.836	40b	*MB*	26281.790	$12260^{\circ}_{3\frac{1}{2}} - 38541_{4\frac{1}{2}}$	5	3812.222	2	*MB*	26223.977	$5010^{\circ}_{2\frac{1}{2}} - 31234_{2\frac{1}{2}}$	−31
				$3508^{\circ}_{0\frac{1}{2}} - 29790_{0\frac{1}{2}}$	−9						
						3812.296	15	*MB*	26223.468	$4201^{\circ}_{1\frac{1}{2}} - 30425_{2\frac{1}{2}}$	13
3804.046	15	*MB*	26280.339	$10798^{\circ}_{2\frac{1}{2}} - 37078_{1\frac{1}{2}}$	15	3812.554	10	*MB*	26221.694		
3804.156	40	*MB*	26279.579	$5651^{\circ}_{5\frac{1}{2}} - 31930_{4\frac{1}{2}}$	0	3812.592	20	*MB*	26221.432	$5716^{\circ}_{3\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−4
3804.537	1	*MB*	26276.947	$7878^{\circ}_{3\frac{1}{2}} - 34155_{3\frac{1}{2}}$	−35	3812.647	2	*MB*	26221.054		
3804.695	12	*MB*	26275.856			3812.689	7	*MB*	26220.765		
3804.755	5	*MB*	26275.442			3812.879	2	*MB*	26219.459		
3804.909	5	*MB*	26274.379			3812.958	4	*MT*	26218.916		
3804.999	12	*MB*	26273.757	$7278^{\circ}_{1\frac{1}{2}} - 33552_{2\frac{1}{2}}$	97	3813.310	5	*MB*	26216.496		
3805.357	20	*MB*	26271.285	$10924^{\circ}_{4\frac{1}{2}} - 37196_{4\frac{1}{2}}$	23	3813.387	2	*MB*	26215.966		
3805.732	5	*MB*	26268.697			3813.570	50	*MB*	26214.708	$5716^{\circ}_{3\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−11
3805.901	20	*MB*	26267.530			3813.598	10	*MB*	26214.516	$5924^{\circ}_{1\frac{1}{2}} - 32138_{2\frac{1}{2}}$	22
3806.364	20	*MB*	26264.335	$11387^{\circ}_{3\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−24	3813.678	12	*MB*	26213.966		
3806.408	15	*MB*	26264.031	$7713^{\circ}_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−19	3813.739	7	*MB*	26213.546		
3806.716	25	*MB*	26261.907	$5675^{\circ}_{4\frac{1}{2}} - 31937_{3\frac{1}{2}}$	17	3813.848	7	*MB*	26212.797		
3806.918	5	*MB*	26260.513			3814.118	10	*MB*	26210.942		
						3814.486	25	*MB*	26208.413		
3807.241	12	*MB*	26258.285			3814.639	25	*MB*	26207.362	$7202^{\circ}_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−5
3807.324	12	*MB*	26257.713			3814.670	1	*MB*	26207.149		
3807.521	1	*MB*	26256.354	$8169^{\circ}_{1\frac{1}{2}} - 34426_{2\frac{1}{2}}$	16	3814.940	30	*MB*	26205.294	$3703^{\circ}_{3\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−15
3807.689	100	*MB*	26255.196	$5942^{\circ}_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	12	3815.007	70	*MB*	26204.834	$11325^{\circ}_{2\frac{1}{2}} - 37530_{1\frac{1}{2}}$	−17
				$5675^{\circ}_{4\frac{1}{2}} - 31930_{4\frac{1}{2}}$	23					$2140^{\circ}_{0\frac{1}{2}} - 28345_{0\frac{1}{2}}$	10

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
						3823.941	12	*MB*	26143.612		
3815.295	1	*MB*	26202.856	$10641°_{2\frac{1}{2}} - 36844_{2\frac{1}{2}}$	−6	3823.978	10	*MB*	26143.359		
3815.367	20	*MB*	26202.362	$9723°_{4\frac{1}{2}} - 35925_{3\frac{1}{2}}$	15	3824.105	25	*MB*	26142.491	$20554_{5\frac{1}{2}} - 46697°_{4\frac{1}{2}}$	3
3815.610	20	*MB*	26200.693	$11387°_{3\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−48	3824.330	20	*MB*	26140.953		
				$3593°_{4\frac{1}{2}} - 29794_{3\frac{1}{2}}$	58	3824.407	7	*MB*	26140.427		
3815.681	30	*MB*	26200.205			3824.586	12	*MB*	26139.203	$7454_{1\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	3
3815.794	400	*MB*	26199.429	$987°_{4\frac{1}{2}} - 27187_{3\frac{1}{2}}$	−6	3824.856	50	*MB*	26137.358	$7522°_{5\frac{1}{2}} - 33659_{5\frac{1}{2}}$	12
3815.841	80	*WA*	26199.107	$6517°_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	79	3825.848	20	*MB*	26130.581	$5437°_{3\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−15
3816.141	25	*MB*	26197.047	$5010°_{2\frac{1}{2}} - 31207_{3\frac{1}{2}}$	−9	3825.990	5	*MB*	26129.611		
3816.309	40	*MB*	26195.894	$5942°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−5	3826.534	25	*MB*	26125.897	$4511°_{2\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−2
3816.395	15	*MB*	26195.304	$6521°_{1\frac{1}{2}} - 32716_{2\frac{1}{2}}$	−10	3827.117	7	*MB*	26121.917		
3816.580	10	*MB*	26194.034			3827.218	80	*MB*	26121.228	$5437°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	24
3816.677	2	*MB*	26193.368			3827.323	15	*MB*	26120.511	$6517°_{2\frac{1}{2}} - 32638_{1\frac{1}{2}}$	−34
3817.289	12	*MB*	26189.169			3827.370	100	*MB*	26120.190	$14963°_{5\frac{1}{2}} - 41083_{4\frac{1}{2}}$	−3
3817.365	4	*MB*	26188.648	$7818°_{1\frac{1}{2}} - 34006_{0\frac{1}{2}}$	−26	3827.611	12	*MB*	26118.546	$5819°_{4\frac{1}{2}} - 31937_{3\frac{1}{2}}$	6
3817.460	380	*MB*	26187.996	$4844°_{1\frac{1}{2}} - 31032_{0\frac{1}{2}}$	29	3827.854	125	*MB*	26116.888	$4844°_{1\frac{1}{2}} - 30961_{1\frac{1}{2}}$	14
3817.657	10	*MB*	26186.645			3827.906	1	*MB*	26116.533	$8804°_{4\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−30
3817.811	5	*MB*	26185.588			3827.973	50	*MB*	26116.076	$5118°_{2\frac{1}{2}} - 31234_{2\frac{1}{2}}$	3
3817.866	12	*MB*	26185.211	$11949°_{3\frac{1}{2}} - 38134_{4\frac{1}{2}}$	0	3828.080	2	*MB*	26115.346	$7061°_{0\frac{1}{2}} - 33177_{0\frac{1}{2}}$	−11
3818.003	1	*MB*	26184.271	$16545_{5\frac{1}{2}} - 42729°_{5\frac{1}{2}}$	94	3828.596	30	*MB*	26111.826	$5819°_{4\frac{1}{2}} - 31930_{4\frac{1}{2}}$	4
3818.197	5	*MB*	26182.941	$15565°_{2\frac{1}{2}} - 41748_{1\frac{1}{2}}$	82	3828.754	10	*MB*	26110.749	$8702°_{1\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−8
3818.250	10	*MB*	26182.578			3829.269	10	*MB*	26107.237		
3818.530	7	*MB*	26180.658			3829.596	10	*MB*	26105.008		
3818.584	7	*MB*	26180.288			3829.693	130	*MB*	26104.347	$1410°_{4\frac{1}{2}} - 27514_{3\frac{1}{2}}$	−8
3818.685	80	*MB*	26179.595	$4523°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	19	3829.820	20	*MB*	26103.481	$3703°_{3\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−2
3819.019	240	*MB*	26177.306	$4459°_{3\frac{1}{2}} - 30637_{2\frac{1}{2}}$	21	3829.944	75	*MB*	26102.636	$4322°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−4
3819.196	50	*MB*	26176.092	$12365°_{4\frac{1}{2}} - 38541_{4\frac{1}{2}}$	26	3830.024	140	*MB*	26102.091	$6389°_{4\frac{1}{2}} - 32492_{5\frac{1}{2}}$	−4
3819.528	20	*MB*	26173.817	$5964°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	16	3830.294	7	*MB*	26100.251		
3819.821	5	*MB*	26171.810			3830.551	380	*MB*	26098.500	$7713°_{4\frac{1}{2}} - 33811_{4\frac{1}{2}}$	22
3819.996	30	*MB*	26170.611	$3995°_{3\frac{1}{2}} - 30166_{3\frac{1}{2}}$	14	3830.710	7	*MB*	26097.417	$12097_{3\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	−34
3820.429	20	*MB*	26167.645			3830.909	125	*MB*	26096.061	$2634°_{2\frac{1}{2}} - 28730_{3\frac{1}{2}}$	15
3820.546	5	*MB*	26166.843	$10035°_{5\frac{1}{2}} - 36202_{4\frac{1}{2}}$	−2	3831.075	400	*MB*	26094.930	$3854_{3\frac{1}{2}} - 29948°_{2\frac{1}{2}}$	29
3820.649	25	*MB*	26166.138	$7878°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	25	3831.316	7	*MB*	26093.289		
3820.865	50	*MB*	26164.659	$4910°_{5\frac{1}{2}} - 31075_{4\frac{1}{2}}$	19	3831.546	100	*MB*	26091.723	$4737°_{2\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−27
3820.970	1	*MB*	26163.940	$6638°_{4\frac{1}{2}} - 32802_{5\frac{1}{2}}$	33	3831.600	20	*MB*	26091.355		
3821.064	15	*MB*	26163.296			3831.662	75	*MB*	26090.933	$3703°_{3\frac{1}{2}} - 29794_{3\frac{1}{2}}$	10
3821.260	140	*MB*	26161.954	$2563°_{5\frac{1}{2}} - 28725_{4\frac{1}{2}}$	39	3831.781	75	*MB*	26090.123	$2595°_{1\frac{1}{2}} - 28685_{2\frac{1}{2}}$	9
3821.514	1	*MB*	26160.215	$17300°_{3\frac{1}{2}} - 43460_{2\frac{1}{2}}$	−7	3831.926	75	*MB*	26089.135	$2641°_{3\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−17
3821.579	40	*MB*	26159.770	$5010°_{2\frac{1}{2}} - 31170_{1\frac{1}{2}}$	−4					$5118°_{2\frac{1}{2}} - 31207_{3\frac{1}{2}}$	15
3821.694	150	*MB*	26158.983	$4266°_{3\frac{1}{2}} - 30425_{2\frac{1}{2}}$	32	3831.970	10	*MB*	26088.836	$14387_{4\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	23
3821.947	15	*MB*	26157.252	$8175°_{2\frac{1}{2}} - 34333_{2\frac{1}{2}}$	17	3832.053	60	*MB*	26088.271	$6549°_{2\frac{1}{2}} - 32638_{1\frac{1}{2}}$	14
3822.015	2	*MB*	26156.786			3832.222	90	*MB*	26087.120	$5651°_{5\frac{1}{2}} - 31738_{5\frac{1}{2}}$	−6
3822.059	2	*MB*	26156.485			3832.332	40	*MB*	26086.371	$3363°_{2\frac{1}{2}} - 29449_{1\frac{1}{2}}$	21
3822.437	15	*MB*	26153.899			3832.648	30	*MB*	26084.221	$9723°_{4\frac{1}{2}} - 35807_{4\frac{1}{2}}$	−11
3822.890	15	*MB*	26150.800	$7259°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−21	3832.743	80	*MB*	26083.574	$2641°_{3\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−14
3823.091	10	*MB*	26149.425	$2581°_{4\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−29	3833.053	5	*MB*	26081.465		
3823.328	12	*MB*	26147.804			3833.119	2	*MB*	26081.016		
3823.492	25	*MB*	26146.682	$9778°_{2\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−13	3833.308	7	*MB*	26079.730	$13758°_{1\frac{1}{2}} - 39838_{2\frac{1}{2}}$	−44
3823.695	120b	*MB*	26145.294			3833.546	5	*MB*	26078.111		
3823.895	380	*MB*	26143.927	$2581°_{4\frac{1}{2}} - 28725_{4\frac{1}{2}}$	36	3834.009	2	*MB*	26074.962		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3834.249	12	*MB*	26073.329			3842.305	12	*MB*	26018.664		
3834.400	20	*MB*	26072.303			3842.368	7	*MB*	26018.237		
3834.549	400	*MB*	26071.290	$2563°_{5\frac{1}{2}} - 28634_{5\frac{1}{2}}$	7	3842.486	2	*MB*	26017.438		
3834.659	12	*MB*	26070.542	$13784°_{1\frac{1}{2}} - 39855_{0\frac{1}{2}}$	−22	3842.620	5	*MB*	26016.531	$11325°_{2\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−14
3834.780	70	*MB*	26069.719	$3995°_{3\frac{1}{2}} - 30065_{3\frac{1}{2}}$	15	3843.001	5	*MB*	26013.952		
3835.084	5	*MB*	26067.653			3843.275	5	*MB*	26012.097		
3835.533	10	*MB*	26064.601			3843.444	25	*MB*	26010.953		
3835.561	7	*MB*	26064.411			3843.643	10	*MB*	26009.607		
3835.746	40	*MB*	26063.154	$7233°_{5\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−23	3843.762	160	*MB*	26008.801	$7522°_{5\frac{1}{2}} - 33531_{6\frac{1}{2}}$	35
3835.835	30	*MB*	26062.549	$10454°_{1\frac{1}{2}} - 36516_{1\frac{1}{2}}$	23	3843.897	10	*MB*	26007.888	$4737°_{2\frac{1}{2}} - 30745_{1\frac{1}{2}}$	−24
3835.893	40	*MB*	26062.155	$7746°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	23	3843.935	5	*MB*	26007.631		
3835.960	20	*MB*	26061.700			3844.019	5	*MB*	26007.063		
3836.104	220	*MB*	26060.722	$1873°_{3\frac{1}{2}} - 27934_{4\frac{1}{2}}$	18	3844.221	15	*MB*	26005.696		
3836.156	10	*MB*	26060.368			3844.571	15	*MB*	26003.329		
3836.211	12	*MB*	26059.995			3844.797	15	*MB*	26001.800	$11340°_{3\frac{1}{2}} - 37342_{2\frac{1}{2}}$	72
3836.303	2	*MB*	26059.370			3844.854	20	*MB*	26001.415	$8927°_{5\frac{1}{2}} - 34928_{4\frac{1}{2}}$	−39
3836.419	7	*MB*	26058.582			3844.868	7	*MB*	26001.320	$3363°_{2\frac{1}{2}} - 29364_{3\frac{1}{2}}$	7
3836.553	12	*MB*	26057.672			3844.944	5	*MB*	26000.806		
3836.971	17	*MB*	26054.833			3845.231	5	*MB*	25998.866	$10924°_{4\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−46
3837.203	90	*MB*	26053.258	$2581°_{4\frac{1}{2}} - 28634_{5\frac{1}{2}}$	0	3845.276	50	*MB*	25998.561	$3995°_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	−19
3837.426	5	*MB*	26051.744	$7522°_{0\frac{1}{2}} - 33574_{1\frac{1}{2}}$	57	3845.484	80	*MB*	25997.155	$10114°_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	17
3837.527	30	*MB*	26051.058	$2634°_{2\frac{1}{2}} - 28685_{2\frac{1}{2}}$	−33	3845.602	7	*MB*	25996.357	$8169°_{1\frac{1}{2}} - 34166_{1\frac{1}{2}}$	17
3837.841	7	*MB*	26048.927	$10088°_{1\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−36	3845.695	10	*MB*	25995.729		
3838.153	15	*MB*	26046.809	$12762°_{4\frac{1}{2}} - 38809_{3\frac{1}{2}}$	−25	3845.828	15	*MB*	25994.830	$5942°_{3\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−24
3838.309	10	*MB*	26045.751	$10798°_{2\frac{1}{2}} - 36844_{2\frac{1}{2}}$	1	3846.003	25	*MB*	25993.647		
3838.462	3	*MB*	26044.713	$3745°_{1\frac{1}{2}} - 29790_{0\frac{1}{2}}$	−81	3846.140	25	*MB*	25992.721	$9723°_{4\frac{1}{2}} - 35716_{5\frac{1}{2}}$	−26
3838.535	900	*MB*	26044.217	$2641°_{3\frac{1}{2}} - 28685_{2\frac{1}{2}}$	19	3846.515	180	*MB*	25990.187	$8169°_{1\frac{1}{2}} - 34159_{0\frac{1}{2}}$	8
3838.992	20	*MB*	26041.117							$8175°_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	11
3839.191	12	*MB*	26039.767							$7818°_{1\frac{1}{2}} - 33808_{2\frac{1}{2}}$	17
3839.338	7	*MB*	26038.770			3846.565	25	*MB*	25989.849	$6517°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	27
3839.491	100	*MB*	26037.733	$7259°_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	3	3846.777	40	*MB*	25988.417	$7061°_{0\frac{1}{2}} - 33050_{1\frac{1}{2}}$	−35
3839.640	2	*MB*	26036.722			3846.821	40	*MB*	25988.120	$5942°_{3\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−17
3839.659	7	*MB*	26036.594			3846.966	40	*MB*	25987.140		
3839.710	2	*MB*	26036.248			3847.054	15	*MB*	25986.546		
3839.865	7	*MB*	26035.197			3847.120	3	*WA*	25986.100	$6521°_{1\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−9
3839.985	2	*MB*	26034.383			3847.310	7	*MB*	25984.817		
3840.041	2	*MB*	26034.003			3847.579	2	*MB*	25983.000		
3840.303	15	*MB*	26032.227	$5010°_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−12	3847.798	7	*MB*	25981.521		
3840.377	20	*MB*	26031.726			3848.097	200	*MB*	25979.502	$4266°_{3\frac{1}{2}} - 30245_{4\frac{1}{2}}$	22
3840.452	25	*MB*	26031.218	$1873°_{3\frac{1}{2}} - 27905_{4\frac{1}{2}}$	−4	3848.407	20	*MB*	25977.410	$7011_{4\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	−3
3840.513	10	*MB*	26030.804			3848.452	12	*MB*	25977.106	$23640_{4\frac{1}{2}} - 49617°_{5\frac{1}{2}}$	−30
3840.747	4	*WA*	26029.218	$14481°_{2\frac{1}{2}} - 40511_{1\frac{1}{2}}$	21	3848.595	700	*MB*	25976.141	$4203°_{6\frac{1}{2}} - 30180_{6\frac{1}{2}}$	−20
3840.847	10	*MB*	26028.540	$7011_{4\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	−8	3849.020	7	*MB*	25973.273	$9053_{3\frac{1}{2}} - 35026°_{4\frac{1}{2}}$	−41
3841.025	75	*MB*	26027.334	$9198°_{3\frac{1}{2}} - 35225_{2\frac{1}{2}}$	4	3849.057	30	*MB*	25973.023		
3841.076	7	*MB*	26026.989			3849.096	20	*MB*	25972.760	$5964°_{3\frac{1}{2}} - 31937_{3\frac{1}{2}}$	3
3841.436	15	*MB*	26024.550	$11949°_{3\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−36	3849.395	5	*MB*	25970.742		
3841.611	60	*MB*	26023.364	$6389°_{4\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−39	3849.484	80	*MB*	25970.142	$3703_{3\frac{1}{2}} - 29673_{2\frac{1}{2}}$	−33
				$8402°_{3\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−4	3849.559	50	*MB*	25969.636	$1410°_{4\frac{1}{2}} - 27379_{5\frac{1}{2}}$	−8
3841.707	100	*MB*	26022.714	$10114°_{2\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−6	3849.662	50	*MB*	25968.941	$10924°_{4\frac{1}{2}} - 36893_{3\frac{1}{2}}$	48
3842.043	40	*MB*	26020.438	$7059°_{4\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−1	3849.975	7	*MB*	25966.830		

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3850.097	60	*MB*	25966.007	$5964°_{3\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−32	3859.478	2	*MB*	25902.895		
3850.125	40	*MB*	25965.819	$9491°_{0\frac{1}{2}} - 35457_{1\frac{1}{2}}$	−5	3859.611	5	*MB*	25902.002		
3850.175	12	*MB*	25965.481	$4459°_{3\frac{1}{2}} - 30425_{2\frac{1}{2}}$	4	3859.943	40	*MB*	25899.774	$4737°_{2\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−9
3850.306	10	*MB*	25964.598			3860.167	35	*MB*	25898.271	$7278°_{1\frac{1}{2}} - 33177_{0\frac{1}{2}}$	−2
3850.359	2	*MB*	25964.241			3860.402	100	*MB*	25896.695	$6967_{6\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	−35
3850.705	25	*MB*	25961.908	$5969°_{5\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−20	3860.640	50	*MB*	25895.099	$14963°_{5\frac{1}{2}} - 40858_{4\frac{1}{2}}$	−5
3850.783	50	*MB*	25961.382	$13117_{4\frac{1}{2}} - 39079°_{5\frac{1}{2}}$	6	3860.988	50	*MB*	25892.765	$8402°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−16
3850.985	10	*MB*	25960.020			3861.065	7	*MB*	25892.248	$5675°_{4\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−7
3851.271	25	*MB*	25958.092			3861.205	5	*MB*	25891.309		
3851.352	35	*MB*	25957.546	$6549°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	12	3861.266	7	*MB*	25890.900		
3851.430	2	*MB*	25957.020			3861.482	25	*MB*	25889.452	$7259°_{3\frac{1}{2}} - 33148_{2\frac{1}{2}}$	−61
3851.793	7	*MB*	25954.574	$11387°_{3\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−21	3861.584	20	*MB*	25888.768	$6913°_{6\frac{1}{2}} - 32802_{5\frac{1}{2}}$	−4
3852.097	80	*MB*	25952.526	$2382°_{4\frac{1}{2}} - 28334_{4\frac{1}{2}}$	16	3861.762	7	*MB*	25887.575	$5283°_{0\frac{1}{2}} - 31170_{1\frac{1}{2}}$	−40
3852.372	10	*MB*	25950.674	$5010°_{2\frac{1}{2}} - 30961_{1\frac{1}{2}}$	26	3861.925	60	*MB*	25886.482	$5964°_{3\frac{1}{2}} - 31851_{2\frac{1}{2}}$	−18
3852.590	5	*MB*	25949.205			3862.134	25	*MB*	25885.082	$8280°_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	−10
3852.675	5	*MB*	25948.633			3862.184	12	*MB*	25884.747		
3852.757	2	*MB*	25948.080	$7092_{5\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	−7	3862.463	160	*MB*	25882.877	$5675°_{4\frac{1}{2}} - 31558_{3\frac{1}{2}}$	14
3852.939	20	*MB*	25946.855	$7713°_{4\frac{1}{2}} - 33659_{5\frac{1}{2}}$	−23	3862.806	5	*MB*	25880.579		
3853.148	700	*MB*	25945.447	$0°_{3\frac{1}{2}} - 25945_{3\frac{1}{2}}$	52	3863.017	1	*MB*	25879.165	$13515°_{3\frac{1}{2}} - 39394_{3\frac{1}{2}}$	25
3853.523	5	*MB*	25942.923			3863.140	2	*MB*	25878.341		
3853.552	2	*MB*	25942.727			3863.234	20	*MB*	25877.711		
3854.187	1000	*MB*	25938.453	$1873°_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−10	3863.589	40	*MB*	25875.334	$10641°_{2\frac{1}{2}} - 36516_{1\frac{1}{2}}$	−21
3854.320	1000	*MB*	25937.558	$1873°_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−3	3863.731	50	*MB*	25874.383	$8280°_{2\frac{1}{2}} - 34155_{3\frac{1}{2}}$	18
3854.960	30	*MB*	25933.252	$18704_{5\frac{1}{2}} - 44637°_{6\frac{1}{2}}$	17	3863.924	2	*MB*	25873.090		
				$7878°_{3\frac{1}{2}} - 33811_{4\frac{1}{2}}$	13	3864.107	7	*MB*	25871.865	$7722_{2\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	−1
3855.199	40	*MB*	25931.645	$5437°_{3\frac{1}{2}} - 31369_{2\frac{1}{2}}$	−25	3864.341	20	*MB*	25870.299		
3855.301	500	*MB*	25930.959	$4203°_{6\frac{1}{2}} - 30134_{5\frac{1}{2}}$	−16	3864.438	15	*MB*	25869.649	$7278°_{1\frac{1}{2}} - 33148_{2\frac{1}{2}}$	−17
3855.859	10	*MB*	25927.206	$5924°_{1\frac{1}{2}} - 31851_{2\frac{1}{2}}$	13	3864.776	20	*MB*	25867.387		
3855.934	10	*MB*	25926.702			3864.936	2	*MB*	25866.316		
3856.083	2	*MB*	25925.700	$13012°_{2\frac{1}{2}} - 38937_{1\frac{1}{2}}$	−20	3865.151	12	*MB*	25864.877		
3856.289	20	*MB*	25924.315	$5118°_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	11	3865.621	12	*MB*	25861.733		
3856.358	5	*MB*	25923.851			3865.839	5	*MB*	25860.274		
3856.430	2	*MB*	25923.367			3866.188	2	*MB*	25857.940		
3856.708	2	*MB*	25921.499			3866.415	15	*MB*	25856.422		
3856.870	2	*MB*	25920.410			3866.547	7	*MB*	25855.539	$11340°_{3\frac{1}{2}} - 37196_{4\frac{1}{2}}$	−1
3857.024	320	*MB*	25919.375	$5819°_{4\frac{1}{2}} - 31738_{5\frac{1}{2}}$	4	3866.809	130	*MB*	25853.787	$987°_{4\frac{1}{2}} - 26841_{4\frac{1}{2}}$	14
3857.237	140	*MB*	25917.944	$3363°_{2\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−2	3866.904	3	*MB*	25853.152		
3857.426	12	*MB*	25916.674	$12057°_{2\frac{1}{2}} - 37973_{3\frac{1}{2}}$	5	3866.993	1	*MB*	25852.557	$7011_{4\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	83
				$5651°_{5\frac{1}{2}} - 31568_{4\frac{1}{2}}$	12	3867.107	25	*MB*	25851.795	$5716°_{3\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−7
3857.641	300	*MB*	25915.229	$2382°_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	3	3867.560	20	*MB*	25848.767		
3857.810	60	*MB*	25914.094	$4511°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	2	3867.671	7	*MB*	25848.025		
3857.926	40	*MB*	25913.315	$20783_{5\frac{1}{2}} - 46697°_{4\frac{1}{2}}$	23	3867.878	20	*MB*	25846.642		
3858.023	5	*MB*	25912.663	$987°_{4\frac{1}{2}} - 26900_{3\frac{1}{2}}$	−79	3867.971	10	*MB*	25846.020		
3858.303	5	*MB*	25910.783			3868.061	25	*MB*	25845.419	$2879°_{5\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−33
3858.463	5	*MB*	25909.709			3868.131	160	*MB*	25844.951	$3593°_{4\frac{1}{2}} - 29438_{5\frac{1}{2}}$	17
3858.631	5	*MB*	25908.581	$5942°_{3\frac{1}{2}} - 31851_{2\frac{1}{2}}$	−17	3868.377	12	*MB*	25843.308	$4322°_{2\frac{1}{2}} - 30166_{3\frac{1}{2}}$	−40
3858.733	2	*MB*	25907.896			3868.473	50	*MB*	25842.667	$5118°_{2\frac{1}{2}} - 30961_{1\frac{1}{2}}$	−44
3858.862	7	*MB*	25907.030			3868.510	130	*MB*	25842.419	$5716°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	10
3858.921	7	*MB*	25906.633	$11325°_{2\frac{1}{2}} - 37232_{1\frac{1}{2}}$	−23	3868.590	15	*MB*	25841.885	$5924°_{1\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−19
3859.208	5	*MB*	25904.707			3868.937	5	*MB*	25839.567		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3869.121	5	*MB*	25838.339			3878.585	10	*MB*	25775.293		
3869.148	2	*MB*	25838.158			3878.750	25	*MB*	25774.196	$7522°_{5/2}-33296_{4 1/2}$	13
3869.319	20	*MB*	25837.016	$10274°_{3 1/2}-36112_{3 1/2}$	−33	3879.062	100	*MB*	25772.123	$15517°_{6 1/2}-41289_{5 1/2}$	−75
3869.393	7	*MB*	25836.522	$11007°_{1 1/2}-36844_{2 1/2}$	17	3879.101	25	*MB*	25771.864	$12365°_{4 1/2}-38137_{5 1/2}$	−11
3869.562	50	*MB*	25835.394	$9723°_{4 1/2}-35558_{3 1/2}$	27					$10035°_{5 1/2}-35807_{4 1/2}$	7
3869.713	10	*MB*	25834.386	$10454°_{1 1/2}-36288_{0 1/2}$	0	3879.178	30	*MB*	25771.353	$7278°_{1 1/2}-33050_{1 1/2}$	−15
3869.931	15	*MB*	25832.931			3879.263	25	*MB*	25770.788	$3593°_{4 1/2}-29364_{3 1/2}$	−69
3870.017	17	*MB*	25832.357	$10684°_{0 1/2}-36516_{1 1/2}$	0	3879.309	50	*MB*	25770.482	$5437°_{3 1/2}-31207_{3 1/2}$	−22
3870.176	15	*MB*	25831.295			3879.436	5	*MB*	25769.639		
3870.685	2	*MB*	25827.899	$7746°_{2 1/2}-33574_{1 1/2}$	−60	3879.465	12	*MB*	25769.446	$5969°_{5 1/2}-31738_{5 1/2}$	−30
3870.867	130	*MB*	25826.684	$5513_{5 1/2}-31340°_{6 1/2}$	0	3879.597	50	*MB*	25768.569	$12365°_{4 1/2}-38134_{4 1/2}$	−24
3871.332	15	*MB*	25823.582			3879.637	2	*MB*	25768.304	$6549°_{2 1/2}-32318_{3 1/2}$	37
3871.398	60	*MB*	25823.142	$9634°_{1 1/2}-35457_{1 1/2}$	10	3879.673	10	*MB*	25768.065		
3871.802	30	*MB*	25820.447	$7259°_{3 1/2}-33079_{3 1/2}$	11	3879.963	35	*MB*	25766.139	$7278°_{1 1/2}-33045_{2 1/2}$	−33
3872.128	30	*MB*	25818.274	$5010°_{2 1/2}-30829_{3 1/2}$	20	3880.103	7	*MB*	25765.209		
3872.449	7	*MB*	25816.134			3880.403	50	*MB*	25763.217	$14276_{5 1/2}-40039°_{6 1/2}$	−8
3872.501	10	*MB*	25815.787			3880.587	5	*MB*	25761.996		
3872.875	10	*MB*	25813.294	$7722_{2 1/2}-33535°_{3 1/2}$	−56	3880.730	1	*MB*	25761.046		
3873.129	30	*MB*	25811.601	$3995°_{3 1/2}-29807_{3 1/2}$	−16	3880.791	5	*MB*	25760.641		
3873.182	20	*MB*	25811.248	$12326°_{6 1/2}-38137_{5 1/2}$	−16	3880.876	5	*MB*	25760.077		
3873.249	50	*MB*	25810.801	$10114°_{2 1/2}-35925_{3 1/2}$	3	3881.064	2	*MB*	25758.830		
3873.374	2	*MB*	25809.968			3881.242	10	*MB*	25757.648		
3873.661	20	*MB*	25808.056	$6389°_{4 1/2}-32197_{4 1/2}$	17	3881.497	20	*MB*	25755.956	$7818°_{1 1/2}-33574_{1 1/2}$	−41
3873.838	2	*MB*	25806.877			3881.670	150	*MB*	25754.808	$2879°_{5 1/2}-28634_{5 1/2}$	−12
3873.876	2	*MB*	25806.624			3881.875	140	*MB*	25753.448	$2581°_{4 1/2}-28334_{4 1/2}$	−50
3873.910	5	*MB*	25806.398	$7746°_{2 1/2}-33552_{2 1/2}$	1	3882.004	10	*MB*	25752.592	$8402°_{3 1/2}-34155_{3 1/2}$	−50
3874.213	15	*MB*	25804.379	$20783_{5 1/2}-46588°_{5 1/2}$	40	3882.447	1200	*MB*	25749.654	$2595°_{1 1/2}-28345_{0 1/2}$	−17
3874.319	35	*MB*	25803.673	$7059°_{4 1/2}-32862_{3 1/2}$	−21	3882.561	40	*MB*	25748.898	$5819°_{4 1/2}-31568_{4 1/2}$	−7
3874.465	2	*MB*	25802.701			3882.695	10	*MB*	25748.009		
3874.580	20	*MB*	25801.935			3882.804	15	*MB*	25747.286	$12057°_{2 1/2}-37804_{1 1/2}$	−40
3874.677	220	*MB*	25801.289	$8175°_{2 1/2}-33977_{3 1/2}$	12	3882.968	5	*MB*	25746.199		
3875.007	110	*MB*	25799.092	$3995°_{3 1/2}-29794_{3 1/2}$	35	3883.140	5	*MB*	25745.059		
3875.056	110	*MB*	25798.766	$4266°_{3 1/2}-30065_{3 1/2}$	0	3883.226	2	*MB*	25744.488		
3875.092	2	*MB*	25798.526	$7061°_{0 1/2}-32860_{0 1/2}$	11	3883.255	10	*MB*	25744.296		
3875.253	75	*MB*	25797.454	$5437°_{3 1/2}-31234_{2 1/2}$	−2	3883.446	35	*MB*	25743.030	$7059°_{4 1/2}-32802_{5 1/2}$	−62
3875.358	5	*MB*	25796.755			3883.540	50	*MB*	25742.407	$4322°_{2 1/2}-30065_{3 1/2}$	−48
3875.596	7	*MB*	25795.171			3883.581	60	*MB*	25742.135	$2595°_{1 1/2}-28337_{2 1/2}$	−34
3875.903	50	*MB*	25793.128	$6521°_{1 1/2}-32314_{0 1/2}$	−8	3883.657	1	*MB*	25741.631		
3875.999	40	*MB*	25792.489	$4844°_{1 1/2}-30637_{2 1/2}$	−23	3883.811	12	*MB*	25740.611		
3876.125	140	*MB*	25791.651	$4910°_{5 1/2}-30702_{4 1/2}$	4	3883.984	35	*MB*	25739.464	$5819°_{4 1/2}-31558_{3 1/2}$	−48
3876.167	2	*MB*	25791.371	$17851°_{0 1/2}-43643_{0 1/2}$	−58	3884.209	80	*MB*	25737.973	$12456_{3 1/2}-38194°_{4 1/2}$	−8
3876.244	5	*MB*	25790.859			3884.340	20	*MB*	25737.105		
3876.288	7	*MB*	25790.566			3884.499	15	*MB*	25736.052	$9198°_{3 1/2}-34934_{2 1/2}$	−44
3876.365	60	*MB*	25790.054	$12751°_{5 1/2}-38541_{4 1/2}$	−36	3884.562	40	*MB*	25735.634	$13659°_{4 1/2}-39394_{3 1/2}$	−29
3876.971	500	*MB*	25786.023	$4459°_{3 1/2}-30245_{4 1/2}$	17	3884.749	40	*MB*	25734.396	$7818°_{1 1/2}-33552_{2 1/2}$	−38
										$5010°_{2 1/2}-30745_{1 1/2}$	−19
3877.555	35	*MB*	25782.139	$4201°_{1 1/2}-29984_{1 1/2}$	−19						
3877.777	2	*MB*	25780.663			3885.157	15	*MB*	25731.693		
3877.805	2	*MB*	25780.477			3885.302	1	*MB*	25730.733	$9198°_{3 1/2}-34928_{4 1/2}$	90
3877.984	2	*WA*	25779.287	$12762°_{4 1/2}-38541_{4 1/2}$	56	3885.399	25	*MB*	25730.090		
3878.358	900	*MB*	25776.801	$1410°_{4 1/2}-27187_{3 1/2}$	59	3885.539	30	*MB*	25729.164		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3885.611	25	*MB*	25728.687			3895.812	12	*MB*	25661.319	$4322°_{2\frac{1}{2}} - 29984_{1\frac{1}{2}}$	−24
3885.707	30	*MB*	25728.051	$5616_{4\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	−37	3895.841	7	*MB*	25661.128	$3703°_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−17
3885.773	40	*MB*	25727.614	$4266°_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	−29	3895.975	7	*MB*	25660.245	$7202°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	8
3885.851	7	*MB*	25727.098	$4165_{4\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	−28	3896.023	5	*MB*	25659.929		
3886.283	5	*MB*	25724.238			3896.071	10	*MB*	25659.613		
3886.375	5	*MB*	25723.629	$8702°_{1\frac{1}{2}} - 34426_{2\frac{1}{2}}$	36	3896.258	12	*MB*	25658.382		
3886.499	80	*MB*	25722.808	$4523°_{4\frac{1}{2}} - 30245_{4\frac{1}{2}}$	−36	3896.639	40	*MB*	25655.873	$2641°_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−40
3886.549	40	*MB*	25722.477	$9198°_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	16	3896.801	480	*MB*	25654.806	$4511°_{2\frac{1}{2}} - 30166_{3\frac{1}{2}}$	7
3887.027	10	*MB*	25719.314			3896.914	15	*MB*	25654.062		
3887.336	12	*MB*	25717.270			3897.221	12	*MB*	25652.042		
3887.506	10	*MB*	25716.145	$2581°_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−70	3897.311	15	*MB*	25651.449		
3887.665	12	*MB*	25715.094			3897.425	40	*MB*	25650.699	$10274°_{3\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−11
3887.856	7	*MB*	25713.830			3897.619	7	*MB*	25649.422		
3888.118	25	*MB*	25712.098			3898.267	400	*MB*	25645.159	$3793°_{6\frac{1}{2}} - 29438_{5\frac{1}{2}}$	−23
3888.266	5	*MB*	25711.119			3898.426	10	*MB*	25644.118	$12326°_{6\frac{1}{2}} - 37970_{5\frac{1}{2}}$	3
3888.363	40	*MB*	25710.478	$14963°_{5\frac{1}{2}} - 40673_{5\frac{1}{2}}$	3	3898.598	20	*MB*	25642.981	$4523°_{4\frac{1}{2}} - 30166_{3\frac{1}{2}}$	−42
3888.389	100	*MB*	25710.306	$5118°_{2\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−11	3898.675	35	*MB*	25642.475	$4266°_{3\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−31
3888.516	7	*MB*	25709.466			3898.790	2	*MB*	25641.719	$8402°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−53
3888.935	20	*MB*	25706.696	$8169°_{1\frac{1}{2}} - 33876_{1\frac{1}{2}}$	17	3898.944	220	*MB*	25640.706	$1873°_{3\frac{1}{2}} - 27514_{3\frac{1}{2}}$	−19
3888.998	100	*MB*	25706.280	$9491°_{0\frac{1}{2}} - 35197_{1\frac{1}{2}}$	−66	3899.081	2	*MB*	25639.805		
3889.302	60	*MB*	25704.270	$3745°_{1\frac{1}{2}} - 29449_{1\frac{1}{2}}$	−32	3899.161	20	*MB*	25639.279	$11949°_{3\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−4
3889.478	60	*MB*	25703.107	$2634°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−40	3899.266	25	*MB*	25638.588	$8169°_{1\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−30
3889.795	30	*MB*	25701.013			3899.326	12	*MB*	25638.194	$5437°_{3\frac{1}{2}} - 31075_{4\frac{1}{2}}$	13
3889.984	850	*MB*	25699.764	$5455°_{7\frac{1}{2}} - 31155_{6\frac{1}{2}}$	−13	3899.381	40	*MB*	25637.832	$5513_{5\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	8
3890.439	50	*MB*	25696.758	$7713°_{4\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−49	3899.758	7	*MB*	25635.354		
3890.522	50	*MB*	25696.210	$8280°_{2\frac{1}{2}} - 33977_{3\frac{1}{2}}$	16	3899.979	5	*MB*	25633.901		
				$2641°_{3\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−44	3900.202	60	*MB*	25632.436	$8175°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−17
3890.746	170	*MB*	25694.731	$2140°_{0\frac{1}{2}} - 27835_{1\frac{1}{2}}$	−9	3900.482	1	*MB*	25630.596	$8702°_{1\frac{1}{2}} - 34333_{2\frac{1}{2}}$	−57
3890.980	170	*MB*	25693.186	$2641°_{3\frac{1}{2}} - 28334_{4\frac{1}{2}}$	−10	3900.565	12	*MB*	25630.050	$8278_{5\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	−88
3891.250	15	*MB*	25691.403			3900.623	10	*MB*	25629.669		
3891.511	7	*MB*	25689.680			3900.665	20	*MB*	25629.393		
3891.772	40	*MB*	25687.957	$4737°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−18	3900.861	5	*MB*	25628.105		
3891.961	10	*MB*	25686.710			3900.983	12	*MB*	25627.304		
3892.439	5	*MB*	25683.555			3901.134	12	*MB*	25626.312	$5010°_{2\frac{1}{2}} - 30637_{2\frac{1}{2}}$	25
3892.594	2	*MB*	25682.533			3901.297	100	*MB*	25625.241	$5942°_{3\frac{1}{2}} - 31568_{4\frac{1}{2}}$	21
3892.780	5	*MB*	25681.306			3901.642	50	*MB*	25622.976	$9723°_{4\frac{1}{2}} - 35346_{3\frac{1}{2}}$	29
3892.928	15	*MB*	25680.329	$10035°_{5\frac{1}{2}} - 35716_{5\frac{1}{2}}$	−42	3901.844	3	*MB*	25621.649		
3893.139	2	*MB*	25678.937			3902.057	6	*MB*	25620.251		
3893.234	140	*MB*	25678.311	$9778°_{2\frac{1}{2}} - 35457_{1\frac{1}{2}}$	−20	3902.112	7	*MB*	25619.889		
				$3995°_{3\frac{1}{2}} - 29673_{2\frac{1}{2}}$	1	3902.253	7	*MB*	25618.964		
3893.401	5	*MB*	25677.209			3902.399	3	*MB*	25618.005		
3893.438	20	*MB*	25676.965			3902.441	10	*MB*	25617.730	$13217_{3\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	−27
3893.851	60	*MB*	25674.242	$7878°_{3\frac{1}{2}} - 33552_{2\frac{1}{2}}$	−11	3902.499	10	*MB*	25617.349	$6521°_{1\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−16
3893.960	10	*MB*	25673.523			3902.613	5	*MB*	25616.601		
3894.045	5	*MB*	25672.963			3902.727	8	*MB*	25615.852	$5942°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	24
3894.296	60	*MB*	25671.308	$4322°_{2\frac{1}{2}} - 29994_{2\frac{1}{2}}$	−24	3902.873	12	*MB*	25614.894	$9198°_{3\frac{1}{2}} - 34813_{2\frac{1}{2}}$	18
3894.347	15	*MB*	25670.972			3902.945	5	*MB*	25614.422		
3894.555	5	*MB*	25669.601			3903.142	2	*MB*	25613.129		
3895.113	500	*MB*	25665.924	$3363°_{2\frac{1}{2}} - 29029_{1\frac{1}{2}}$	−1	3903.238	10	*MB*	25612.499		
3895.448	40	*MB*	25663.717	$7746°_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	5	3903.332	160	*MB*	25611.882	$4523°_{4\frac{1}{2}} - 30134_{5\frac{1}{2}}$	5

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3903.488	2	*MB*	25610.858			3910.832	2	*MB*	25562.766		
3903.730	1	*MB*	25609.271			3911.297	100	*MB*	25559.727	$6638°_{4\frac{1}{2}} - 32197_{4\frac{1}{2}}$	3
3903.923	70	*MB*	25608.005	$12365°_{4\frac{1}{2}} - 37973_{3\frac{1}{2}}$	35	3911.340	3	*MB*	25559.446		
3903.974	3	*MB*	25607.670			3911.519	1	*MB*	25558.276		
3904.048	5	*MB*	25607.185			3911.953	4	*MB*	25555.441		
3904.181	15	*MB*	25606.313			3912.185	160	*MB*	25553.925	$4511°_{2\frac{1}{2}} - 30065_{3\frac{1}{2}}$	19
3904.336	200	*MB*	25605.296	$4459°_{3\frac{1}{2}} - 30065_{3\frac{1}{2}}$	4	3912.321	5	*MB*	25553.037		
3904.500	8	*MB*	25604.221	$7011_{4\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	6	3912.342	2	*MB*	25552.900		
				$10684°_{0\frac{1}{2}} - 36288_{0\frac{1}{2}}$	3	3912.426	700	*MB*	25552.351	$2382°_{4\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−40
3904.575	40	*MB*	25603.729	$7259°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	37	3912.988	12	*MB*	25548.682		
3904.624	2	*MB*	25603.407			3913.137	5	*MB*	25547.709	$6389°_{4\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−1
3905.106	5	*MB*	25600.247			3913.238	7	*MB*	25547.049		
3905.181	9	*MB*	25599.756			3913.469	7	*MB*	25545.541		
3905.290	12	*MB*	25599.041	$5969°_{5\frac{1}{2}} - 31568_{4\frac{1}{2}}$	29	3913.987	80	*MB*	25542.161	$4523°_{4\frac{1}{2}} - 30065_{3\frac{1}{2}}$	30
3905.534	10	*MB*	25597.442			3914.167	12	*MB*	25540.986	$6389°_{4\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−7
3905.845	5	*MB*	25595.404	$8280°_{2\frac{1}{2}} - 33876_{1\frac{1}{2}}$	−26	3914.407	9	*MB*	25539.420	$14315°_{0\frac{1}{2}} - 39855_{0\frac{1}{2}}$	−46
3905.917	6	*MB*	25594.932	$12057°_{2\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−51	3914.513	2	*MB*	25538.729		
3906.014	2	*MB*	25594.296			3914.718	2	*MB*	25537.391		
3906.108	25	*MB*	25593.681	$5964°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−48	3914.946	70	*MB*	25535.904	$3745°_{1\frac{1}{2}} - 29281_{2\frac{1}{2}}$	5
3906.207	1	*MB*	25593.032			3915.062	8	*MB*	25535.147		
3906.323	2	*MB*	25592.272			3915.216	9	*MB*	25534.143	$4459°_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	−25
3906.443	15	*MB*	25591.486	$9634°_{1\frac{1}{2}} - 35225_{2\frac{1}{2}}$	16	3915.518	280	*MB*	25532.174	$5675°_{4\frac{1}{2}} - 31207_{3\frac{1}{2}}$	10
3906.661	1	*MB*	25590.058			3915.618	10	*MB*	25531.522	$7878°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−46
3906.918	140	*MB*	25588.375	$4201°_{1\frac{1}{2}} - 29790_{0\frac{1}{2}}$	−1	3915.643	10	*MB*	25531.359	$12057°_{2\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−6
3907.072	1	*MB*	25587.366			3915.870	2	*MB*	25529.879		
3907.286	550	*MB*	25585.964	$8927°_{5\frac{1}{2}} - 34513_{6\frac{1}{2}}$	11	3916.145	280	*MB*	25528.086	$4266°_{3\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−33
3907.430	110	*MB*	25585.022	$4165_{4\frac{1}{2}} - 29750°_{5\frac{1}{2}}$	25	3916.187	20	*MB*	25527.812	$7522°_{0\frac{1}{2}} - 33050_{1\frac{1}{2}}$	−20
3907.530	2	*MB*	25584.367			3916.254	10	*MB*	25527.375	$8280°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	5
3907.638	5	*MB*	25583.660	$7713°_{4\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−55	3916.520	12	*MB*	25525.642		
3907.714	7	*MB*	25583.162	$11340°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−28	3916.609	1	*MB*	25525.062		
3907.736	4	*MB*	25583.018			3916.801	8	*MB*	25523.811	$7092_{5\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	57
3907.977	10	*MB*	25581.440	$7278°_{1\frac{1}{2}} - 32860_{0\frac{1}{2}}$	10	3916.886	20	*MB*	25523.257	$7341_{5\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	−13
3908.088	70	*MB*	25580.714	$4844°_{1\frac{1}{2}} - 30425_{2\frac{1}{2}}$	9	3916.937	100	*MB*	25522.924	$2382°_{4\frac{1}{2}} - 27905_{4\frac{1}{2}}$	14
3908.238	1	*MB*	25579.732			3917.253	50	*MB*	25520.865	$3508°_{0\frac{1}{2}} - 29029_{1\frac{1}{2}}$	−17
3908.401	400	*MB*	25578.665	$6913°_{6\frac{1}{2}} - 32492_{5\frac{1}{2}}$	20	3917.422	6	*MB*	25519.765	$15565°_{2\frac{1}{2}} - 41085_{3\frac{1}{2}}$	−28
3908.532	280	*MB*	25577.808	$3703°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	28	3917.485	2	*MB*	25519.354		
3908.754	80	*MB*	25576.356	$7061°_{0\frac{1}{2}} - 32638_{1\frac{1}{2}}$	29	3917.639	160	*MB*	25518.351	$5118°_{2\frac{1}{2}} - 30637_{2\frac{1}{2}}$	0
3908.784	20	*MB*	25576.159			3917.858	7	*MB*	25516.925	$13012°_{2\frac{1}{2}} - 38529_{2\frac{1}{2}}$	0
3909.040	25	*MB*	25574.484	$8402°_{3\frac{1}{2}} - 33977_{3\frac{1}{2}}$	13	3917.964	20	*MB*	25516.182		
3909.133	3	*MB*	25573.876			3918.053	10	*MB*	25515.655		
3909.227	5	*MB*	25573.261			3918.189	4	*MB*	25514.769		
3909.309	190	*MB*	25572.724	$3593°_{4\frac{1}{2}} - 29166_{4\frac{1}{2}}$	10	3918.269	550	*MB*	25514.248	$5616_{4\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	4
3909.507	3	*MB*	25571.429	$15529_{2\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	74	3919.075	6	*MB*	25509.001	$11007°_{1\frac{1}{2}} - 36516_{1\frac{1}{2}}$	2
3909.744	90	*MB*	25569.879	$4165_{4\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	17	3919.201	2	*MB*	25508.181	$7293°_{6\frac{1}{2}} - 32802_{5\frac{1}{2}}$	−45
3909.772	10	*MB*	25569.696			3919.529	9	*MB*	25506.046	$11387°_{3\frac{1}{2}} - 36893_{3\frac{1}{2}}$	7
3909.924	90	*MB*	25568.702	$2382°_{4\frac{1}{2}} - 27950_{5\frac{1}{2}}$	57	3919.720	2	*MB*	25504.803		
3910.030	2	*MB*	25568.009	$11325°_{2\frac{1}{2}} - 36893_{3\frac{1}{2}}$	20	3919.806	340	*MB*	25504.244	$5651°_{5\frac{1}{2}} - 31155_{6\frac{1}{2}}$	−21
3910.482	5	*MB*	25565.054			3919.911	6	*MB*	25503.561		
3910.686	100	*MB*	25563.720	$9634°_{1\frac{1}{2}} - 35197_{1\frac{1}{2}}$	67	3920.162	4	*MB*	25501.928		
3910.759	2	*MB*	25563.243			3920.357	12	*MB*	25500.659		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3920.396	10	*MB*	25500.406			3928.680	2	*MB*	25446.637	$9778°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−32
3920.577	6	*MB*	25499.229			3928.842	12	*MB*	25445.588	$7061°_{0\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−15
3920.624	6	*MB*	25498.923			3928.950	9	*MB*	25444.888	$5924°_{1\frac{1}{2}} - 31369_{2\frac{1}{2}}$	0
3920.790	10	*MB*	25497.843	$9269°_{0\frac{1}{2}} - 34767_{1\frac{1}{2}}$	−21	3929.115	12	*MB*	25443.820	$10114°_{2\frac{1}{2}} - 35558_{3\frac{1}{2}}$	1
3920.846	10	*MB*	25497.479			3929.221	1	*MB*	25443.133		
3921.411	7	*MB*	25493.805			3929.535	12	*MB*	25441.100		
3921.457	10	*MB*	25493.506	$19950_{6\frac{1}{2}} - 45443°_{7\frac{1}{2}}$	−13	3929.581	2	*MB*	25440.802		
3921.731	420	*MB*	25491.725	$5716°_{3\frac{1}{2}} - 31207_{3\frac{1}{2}}$	14	3929.836	2	*MB*	25439.152		
3921.803	20	*MB*	25491.257	$8804°_{4\frac{1}{2}} - 34295_{4\frac{1}{2}}$	32	3929.956	50	*MB*	25438.375	$5651°_{5\frac{1}{2}} - 31089_{5\frac{1}{2}}$	1
3921.983	8	*MB*	25490.087	$1410°_{4\frac{1}{2}} - 26900_{3\frac{1}{2}}$	38	3930.285	9	*MB*	25436.246		
3922.220	8	*MB*	25488.547			3930.310	2	*MB*	25436.084		
3922.300	8	*MB*	25488.027			3930.454	2	*MB*	25435.152		
3922.545	7	*MB*	25486.435			3930.792	80	*MB*	25432.965	$7059°_{4\frac{1}{2}} - 32492_{5\frac{1}{2}}$	0
3922.767	5	*MB*	25484.993			3931.082	550	*MB*	25431.089	$1410°_{4\frac{1}{2}} - 26841_{4\frac{1}{2}}$	9
3922.861	15	*MB*	25484.382	$4322°_{2\frac{1}{2}} - 29807_{3\frac{1}{2}}$	13	3931.187	8	*MB*	25430.409	$7454_{1\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	−6
3922.912	8	*MB*	25484.051			3931.362	220	*MB*	25429.277	$2382°_{4\frac{1}{2}} - 27811_{3\frac{1}{2}}$	28
3922.933	5	*MB*	25483.915			3931.824	160	*MB*	25426.289	$5942°_{3\frac{1}{2}} - 31369_{2\frac{1}{2}}$	−5
3922.958	2	*MB*	25483.752			3932.144	110	*MB*	25424.220	$5651°_{5\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−25
3923.024	2	*MB*	25483.324			3932.230	7	*MB*	25423.664		
3923.103	400	*MB*	25482.810	$4511°_{2\frac{1}{2}} - 29994_{2\frac{1}{2}}$	27	3932.447	2	*MB*	25422.261		
3923.219	10	*MB*	25482.057			3932.636	2	*MB*	25421.040		
3923.416	7	*MB*	25480.777			3932.796	12	*MB*	25420.005	$6517°_{2\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−28
3923.511	10	*MB*	25480.161	$17232_{7\frac{1}{2}} - 42712°_{6\frac{1}{2}}$	3	3932.976	15	*MB*	25418.842	$9778°_{2\frac{1}{2}} - 35197_{1\frac{1}{2}}$	−11
3923.648	4	*MB*	25479.271			3933.034	3	*MB*	25418.467	$7878°_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−9
3923.766	1	*MB*	25478.505			3933.141	10	*MB*	25417.776		
3924.125	6	*MB*	25476.174			3933.233	10	*MB*	25417.181		
3924.313	40	*MB*	25474.953			3933.385	4	*MB*	25416.199		
3924.542	10	*MB*	25473.467	$12057°_{2\frac{1}{2}} - 37530_{1\frac{1}{2}}$	−58	3933.407	10	*MB*	25416.057		
3924.646	320	*MB*	25472.792	$4511°_{2\frac{1}{2}} - 29984_{1\frac{1}{2}}$	−2	3933.504	5	*MB*	25415.430		
3924.794	50	*MB*	25471.831	$4201°_{1\frac{1}{2}} - 29673_{2\frac{1}{2}}$	−45	3933.526	1	*MB*	25415.288		
				$4322°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	23						
						3933.583	4	*MB*	25414.920		
3924.991	8	*MB*	25470.553	$10641°_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−25	3933.654	90	*MB*	25414.461	$5010°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−17
3925.039	4	*MB*	25470.242			3933.728	220	*MB*	25413.983	$14625_{5\frac{1}{2}} - 40039°_{6\frac{1}{2}}$	−37
3925.093	8	*MB*	25469.891							$5675°_{4\frac{1}{2}} - 31089_{5\frac{1}{2}}$	15
3925.321	1	*MB*	25468.412			3933.830	12	*MB*	25413.324		
3925.396	4	*MB*	25467.925	$19481_{4\frac{1}{2}} - 44949°_{4\frac{1}{2}}$	−45	3933.983	6	*MB*	25412.336		
3925.722	3	*MB*	25465.810			3934.392	7	*MB*	25409.694		
3925.870	12	*MB*	25464.850			3934.512	8	*MB*	25408.919	$8402°_{3\frac{1}{2}} - 33811_{4\frac{1}{2}}$	20
3925.892	20	*MB*	25464.708			3934.751	25	*MB*	25407.376	$4266°_{3\frac{1}{2}} - 29673_{2\frac{1}{2}}$	3
3926.153	12	*MB*	25463.015	$3703°_{3\frac{1}{2}} - 29166_{4\frac{1}{2}}$	12	3934.982	7	*MB*	25405.884		
3926.269	12	*MB*	25462.262	$5283°_{0\frac{1}{2}} - 30745_{1\frac{1}{2}}$	6	3935.038	4	*MB*	25405.522		
3926.666	6	*MB*	25459.688			3935.144	5	*MB*	25404.839	$13256_{1\frac{1}{2}} - 38661°_{1\frac{1}{2}}$	19
3926.783	3	*MB*	25458.930	$19136°_{2\frac{1}{2}} - 44594_{2\frac{1}{2}}$	26	3935.211	2	*MB*	25404.406	$8131_{4\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	−12
3926.997	25	*MB*	25457.542	$7259°_{3\frac{1}{2}} - 32716_{2\frac{1}{2}}$	−29	3935.241	12	*MB*	25404.212	$5964°_{3\frac{1}{2}} - 31369_{2\frac{1}{2}}$	15
3927.144	8	*MB*	25456.589	$11387°_{3\frac{1}{2}} - 36844_{2\frac{1}{2}}$	16	3935.519	12	*MB*	25402.418	$7746°_{2\frac{1}{2}} - 33148_{2\frac{1}{2}}$	14
3927.174	6	*MB*	25456.395	$19138°_{1\frac{1}{2}} - 44594_{2\frac{1}{2}}$	1	3935.919	35	*MB*	25399.836	$5675°_{4\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−3
3927.381	80	*MB*	25455.053	$2879°_{5\frac{1}{2}} - 28334_{4\frac{1}{2}}$	−7	3936.070	7	*MB*	25398.862	$13436_{2\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	−17
3927.561	50	*MB*	25453.887	$11742°_{5\frac{1}{2}} - 37196_{4\frac{1}{2}}$	−6	3936.171	9	*MB*	25398.210	$8175°_{2\frac{1}{2}} - 33574_{1\frac{1}{2}}$	−71
3928.310	110	*MB*	25449.034	$4459°_{3\frac{1}{2}} - 29908_{4\frac{1}{2}}$	2	3936.602	8	*MB*	25395.429		
3928.517	4	*MB*	25447.693			3936.804	50	*MB*	25394.126		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3936.962	9	MB	25393.107	$11949°_{3\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−30
3936.999	8	MB	25392.868		
3937.024	2	MB	25392.707		
3937.136	40	MB	25391.985	$12260°_{3\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−17
3937.177	10	MB	25391.721	$5437°_{3\frac{1}{2}} - 30829_{3\frac{1}{2}}$	19
3937.270	2	MB	25391.121		
3937.372	7	MB	25390.463		
3937.621	15	MB	25388.857	$7722_{2\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	−20
3937.806	35	MB	25387.665	$2563°_{5\frac{1}{2}} - 27950_{5\frac{1}{2}}$	7
3938.001	1	MB	25386.408		
3938.077	400	MB	25385.918	$12751°_{5\frac{1}{2}} - 38137_{5\frac{1}{2}}$	18
3938.341	9	MB	25384.216		
3938.601	15	MB	25382.540	$12751°_{5\frac{1}{2}} - 38134_{4\frac{1}{2}}$	−77
3938.653	7	MB	25382.205	$12466°_{1\frac{1}{2}} - 37848_{2\frac{1}{2}}$	85
3938.899	5	MB	25380.620		
3938.955	10	MB	25380.259		
3939.178	10	MB	25378.822	$20783_{5\frac{1}{2}} - 46162°_{4\frac{1}{2}}$	−79
3939.242	5	MB	25378.410		
3939.503	15	MB	25376.729	$8175°_{2\frac{1}{2}} - 33552_{2\frac{1}{2}}$	10
3939.531	40	MB	25376.548	$8531_{3\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	34
3939.626	10	MB	25375.937		
3939.654	40	MB	25375.756	$1873°_{3\frac{1}{2}} - 27249_{2\frac{1}{2}}$	21
3939.767	9	MB	25375.028	$12762°_{4\frac{1}{2}} - 38137_{5\frac{1}{2}}$	−12
3939.952	8	MB	25373.837		
3940.111	3	MB	25372.813		
3940.172	4	MB	25372.420		
3940.215	10	MB	25372.143		
3940.326	550	MB	25371.429	$2563°_{5\frac{1}{2}} - 27934_{4\frac{1}{2}}$	24
3940.445	10	MB	25370.662		
3940.613	15	MB	25369.581	$2581°_{4\frac{1}{2}} - 27950_{5\frac{1}{2}}$	−52
3940.658	70	MB	25369.291	$3995°_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	11
3940.752	10	MB	25368.686	$10088°_{1\frac{1}{2}} - 35457_{1\frac{1}{2}}$	8
3940.874	15	MB	25367.901	$8927°_{5\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−34
3940.964	220	MB	25367.321	$3363°_{2\frac{1}{2}} - 28730_{3\frac{1}{2}}$	37
3941.123	12	MB	25366.298		
3941.736	7	MB	25362.353		
3941.767	10	MB	25362.154		
3941.848	10	MB	25361.632	$0°_{3\frac{1}{2}} - 25361_{4\frac{1}{2}}$	−41
3942.157	1400	MB	25359.645	$0°_{3\frac{1}{2}} - 25359_{2\frac{1}{2}}$	−40
3942.245	25	MB	25359.079	$7818°_{1\frac{1}{2}} - 33177_{0\frac{1}{2}}$	30
3942.746	1900	MB	25355.856	$6913°_{6\frac{1}{2}} - 32269_{7\frac{1}{2}}$	−3
3943.132	110	MB	25353.374	$2581°_{4\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−6
3943.491	40	MB	25351.066	$8804°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	−20
				$4322°_{2\frac{1}{2}} - 29673_{2\frac{1}{2}}$	5
3943.881	550	MB	25348.559	$6389°_{4\frac{1}{2}} - 31738_{5\frac{1}{2}}$	18
3944.093	15	MB	25347.197	$4459°_{3\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−8
3944.188	3	MB	25346.586		
3944.544	10	MB	25344.299		
3944.834	50	MB	25342.436	$10114°_{2\frac{1}{2}} - 35457_{1\frac{1}{2}}$	1
3944.918	60	MB	25341.896	$15134_{4\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	21
				$2563°_{5\frac{1}{2}} - 27905_{4\frac{1}{2}}$	−27
3945.519	10	MB	25338.036	$12466°_{1\frac{1}{2}} - 37804_{1\frac{1}{2}}$	32
3945.685	6	MB	25336.970		
3945.851	10	MB	25335.904		
3946.051	9	MB	25334.620	$4459°_{3\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−24
3946.183	15	MB	25333.773	$6517°_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	−4
3946.259	10	MB	25333.285	$7746°_{2\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−41
3946.573	3	MB	25331.269		
3946.709	80	MB	25330.396	$7818°_{1\frac{1}{2}} - 33148_{2\frac{1}{2}}$	−45
3946.758	10	MB	25330.082	$6521°_{1\frac{1}{2}} - 31851_{2\frac{1}{2}}$	17
3946.885	9	MB	25329.267		
3946.992	2	MB	25328.580		
3947.122	12	MB	25327.746	$4737°_{2\frac{1}{2}} - 30065_{3\frac{1}{2}}$	−44
3947.261	8	MB	25326.854	$5716°_{3\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−39
3947.728	10	MB	25323.858	$2581°_{4\frac{1}{2}} - 27905_{4\frac{1}{2}}$	−41
3947.785	4	MB	25323.493		
3947.966	220	MB	25322.332	$3363°_{2\frac{1}{2}} - 28685_{2\frac{1}{2}}$	1
3948.054	10	MB	25321.767		
3948.267	6	MB	25320.401		
3948.321	9	MB	25320.055		
3948.383	5	MB	25319.657		
3948.490	8	MB	25318.971		
3948.825	12	MB	25316.823	$13515°_{3\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−32
3948.947	20	MB	25316.041	$17851°_{0\frac{1}{2}} - 43167_{1\frac{1}{2}}$	−38
3949.128	20	MB	25314.881		
3949.347	8	MB	25313.477	$10798°_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	11
3949.406	130	MB	25313.099	$1873°_{3\frac{1}{2}} - 27187_{3\frac{1}{2}}$	−13
3949.645	1	MB	25311.567	$10314_{4\frac{1}{2}} - 35625°_{3\frac{1}{2}}$	29
3949.738	2	MB	25310.971		
3950.210	3	MB	25307.947		
3950.433	130	MB	25306.518	$5118°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−24
3950.539	20	MB	25305.839		
3950.602	20	MB	25305.436		
3950.688	6	MB	25304.885	$7202°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−27
3950.807	50	MB	25304.123	$7746°_{2\frac{1}{2}} - 33050_{1\frac{1}{2}}$	17
3951.141	5	MB	25301.984		
3951.221	8	MB	25301.472	$6549°_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	−16
3951.415	20	MB	25300.229	$9634°_{1\frac{1}{2}} - 34934_{2\frac{1}{2}}$	−7
3951.622	80	MB	25298.904	$7746°_{2\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−5
3952.107	70	MB	25295.800	$4511°_{2\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−20
3952.545	2200	MB	25292.996	$2641°_{3\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−82
3952.597	90	MB	25292.664	$6638°_{4\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−13
3952.688	20	MB	25292.081	$5942°_{3\frac{1}{2}} - 31234_{2\frac{1}{2}}$	1
3953.486	5	MB	25286.976		
3953.656	240	MB	25285.889	$3995°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−24
3953.917	20	MB	25284.220	$10641°_{2\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−19
3953.943	55	MB	25284.054	$4523°_{4\frac{1}{2}} - 29807_{3\frac{1}{2}}$	9
3953.968	55	MB	25283.894	$3745°_{1\frac{1}{2}} - 29029_{1\frac{1}{2}}$	16
3954.060	7	MB	25283.306	$4511°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	46
3954.172	9	MB	25282.590	$23267_{3\frac{1}{2}} - 48549°_{4\frac{1}{2}}$	−48

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3954.194	3	*MB*	25282.449			3960.913	550	*MB*	25239.562	$2595°_{1\,1/2} - 27835_{1\,1/2}$	−26
3954.441	9	*MB*	25280.870	$11007°_{1\,1/2} - 36288_{0\,1/2}$	10	3961.089	15	*MB*	25238.441		
3954.524	9	*MB*	25280.339	$7092_{5\,1/2} - 32372°_{4\,1/2}$	−16	3961.260	15	*MB*	25237.352		
3954.687	9	*MB*	25279.297			3961.645	20	*MB*	25234.899	$4203°_{6\,1/2} - 29438_{5\,1/2}$	16
3954.757	5	*MB*	25278.850	$15822_{3\,1/2} - 41100°_{2\,1/2}$	−22	3961.727	7	*MB*	25234.377		
3954.869	2	*MB*	25278.134			3961.980	7	*MB*	25232.765		
3954.940	1	*MB*	25277.680	$10924°_{4\,1/2} - 36202_{4\,1/2}$	0	3962.077	110	*MB*	25232.148	$7818°_{1\,1/2} - 33050_{1\,1/2}$	4
3955.100	6	*MB*	25276.658			3962.190	8	*MB*	25231.428	$10114°_{2\,1/2} - 35346_{3\,1/2}$	29
3955.170	7	*MB*	25276.210	$9491°_{0\,1/2} - 34767_{1\,1/2}$	12	3962.416	6	*MB*	25229.989		
3955.271	2	*MB*	25275.565			3962.505	6	*MB*	25229.422		
3955.360	220	*MB*	25274.996	$7341_{5\,1/2} - 32616°_{4\,1/2}$	−15	3962.647	5	*MB*	25228.518	$7278°_{1\,1/2} - 32507_{1\,1/2}$	−1
3955.455	9	*MB*	25274.389			3962.780	8	*MB*	25227.672	$9198°_{3\,1/2} - 34426_{2\,1/2}$	−38
3955.600	10	*MB*	25273.463			3962.896	12	*MB*	25226.933	$7818°_{1\,1/2} - 33045_{2\,1/2}$	−14
3955.647	5	*MB*	25273.162			3963.205	12	*MB*	25224.966		
3955.710	5	*MB*	25272.760			3963.260	7	*MB*	25224.616	$13436_{2\,1/2} - 38661°_{1\,1/2}$	−49
3955.918	110	*MB*	25271.431	$4523°_{4\,1/2} - 29794_{3\,1/2}$	−52	3963.370	70	*MB*	25223.916	$4910°_{5\,1/2} - 30134_{5\,1/2}$	−30
3956.051	160	*MB*	25270.581	$5819°_{4\,1/2} - 31089_{5\,1/2}$	−36	3963.444	10	*MB*	25223.445	$7011_{4\,1/2} - 32235°_{3\,1/2}$	11
3956.100	12	*MB*	25270.268	$7878°_{3\,1/2} - 33148_{2\,1/2}$	8	3963.615	10	*MB*	25222.357		
3956.185	3	*MB*	25269.725			3963.686	3	*MB*	25221.905	$20940_{3\,1/2} - 46162°_{4\,1/2}$	53
3956.275	700	*MB*	25269.150	$4910°_{5\,1/2} - 30180_{6\,1/2}$	18	3964.182	110	*MB*	25218.750	$12751°_{5\,1/2} - 37970_{5\,1/2}$	0
3956.388	9	*MB*	25268.429			3964.287	1	*MB*	25218.082		
3956.898	100	*MB*	25265.172	$5942°_{3\,1/2} - 31207_{3\,1/2}$	43	3964.410	2	*MB*	25217.299		
				$5437°_{3\,1/2} - 30702_{4\,1/2}$	−15	3964.496	280	*MB*	25216.752	$2595°_{1\,1/2} - 27812_{2\,1/2}$	−1
3956.942	5	*MB*	25264.891			3964.593	2	*MB*	25216.135	$6549°_{2\,1/2} - 31766_{1\,1/2}$	−65
3957.151	25	*MB*	25263.557	$2641°_{3\,1/2} - 27905_{4\,1/2}$	−40	3964.742	9	*MB*	25215.188		
3957.395	7	*MB*	25261.999			3964.950	7	*MB*	25213.865	$4459°_{3\,1/2} - 29673_{2\,1/2}$	−32
3957.633	8	*MB*	25260.480			3965.076	12	*MB*	25213.064		
3957.696	9	*MB*	25260.078			3965.382	8	*MB*	25211.118	$12762°_{4\,1/2} - 37973_{3\,1/2}$	−16
3957.860	12	*MB*	25259.031	$7059°_{4\,1/2} - 32318_{3\,1/2}$	−71	3965.421	3	*MB*	25210.870	$7202°_{2\,1/2} - 32413_{3\,1/2}$	53
3957.885	12	*MB*	25258.872			3965.783	7	*MB*	25208.569		
3957.964	110	*MB*	25258.368	$7233°_{5\,1/2} - 32492_{5\,1/2}$	−42	3965.895	10	*MB*	25207.857	$12762°_{4\,1/2} - 37970_{5\,1/2}$	−33
3958.141	10	*MB*	25257.238			3966.245	10	*MB*	25205.633	$9723°_{4\,1/2} - 34928_{4\,1/2}$	0
3958.255	160	*MB*	25256.511	$5819°_{4\,1/2} - 31075_{4\,1/2}$	21	3966.360	3	*MB*	25204.902		
3958.423	6	*MB*	25255.439			3966.590	5	*MB*	25203.440		
3958.785	2	*MB*	25253.129			3966.624	4	*MB*	25203.224		
3958.864	160	*MB*	25252.626	$7061°_{0\,1/2} - 32314_{0\,1/2}$	−4	3966.818	6	*MB*	25201.992		
3958.967	15	*MB*	25251.969			3966.959	3	*MB*	25201.096	$7878°_{3\,1/2} - 33079_{3\,1/2}$	−87
3959.031	3	*MB*	25251.560			3967.044	550	*MB*	25200.556	$2634°_{2\,1/2} - 27835_{1\,1/2}$	−10
3959.519	15	*MB*	25248.448	$6517°_{2\,1/2} - 31766_{1\,1/2}$	−41	3967.177	110	*MB*	25199.711	$5437°_{3\,1/2} - 30637_{2\,1/2}$	−23
3959.609	130	*MB*	25247.874	$4201°_{1\,1/2} - 29449_{1\,1/2}$	−10	3967.290	4	*MB*	25198.993		
3959.730	12	*MB*	25247.103			3967.393	12	*MB*	25198.339		
3959.764	5	*MB*	25246.886	$11949°_{3\,1/2} - 37196_{4\,1/2}$	−63	3967.439	10	*MB*	25198.047	$7293°_{6\,1/2} - 32492_{5\,1/2}$	−52
3959.793	110	*MB*	25246.701	$4737°_{2\,1/2} - 29984_{1\,1/2}$	23	3967.535	80	*MB*	25197.437	$9723°_{4\,1/2} - 34920_{3\,1/2}$	−15
3959.831	25	*MB*	25246.459	$5924°_{1\,1/2} - 31170_{1\,1/2}$	18	3967.581	12	*MB*	25197.145		
3960.093	7	*MB*	25244.789	$6521°_{1\,1/2} - 31766_{1\,1/2}$	12	3967.604	8	*MB*	25196.999		
3960.370	70	*MB*	25243.023	$5964°_{3\,1/2} - 31207_{3\,1/2}$	−7	3967.726	1	*MB*	25196.224		
3960.530	20	*MB*	25242.003			3967.806	6	*MB*	25195.717		
3960.549	30	*MB*	25241.882			3967.868	6	*MB*	25195.323		
3960.740	8	*MB*	25240.665			3967.987	3	*MB*	25194.567		
3960.825	10	*MB*	25240.123	$8804°_{4\,1/2} - 34044_{4\,1/2}$	−93	3968.059	5	*MB*	25194.110		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3968.229	2	*MB*	25193.031			3975.070	190	*MB*	25149.675	$7713°_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−2
3968.256	12	*MB*	25192.859			3975.109	7	*MB*	25149.428	$4844°_{1\frac{1}{2}} - 29994_{2\frac{1}{2}}$	32
3968.542	9	*MB*	25191.044	$11325°_{2\frac{1}{2}} - 36516_{1\frac{1}{2}}$	27	3975.291	7	*MB*	25148.277		
3968.568	8	*MB*	25190.879			3975.455	6	*MB*	25147.240		
3969.159	12	*MB*	25187.128	$10924°_{4\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−16	3975.583	2	*MB*	25146.430		
3969.204	8	*MB*	25186.842			3975.712	8	*MB*	25145.614		
3969.245	15	*MB*	25186.582	$5969°_{5\frac{1}{2}} - 31155_{6\frac{1}{2}}$	−33	3975.882	5	*MB*	25144.539		
3969.351	7	*MB*	25185.910			3976.045	12	*MB*	25143.508	$15576_{1\frac{1}{2}} - 40720°_{1\frac{1}{2}}$	−45
3969.781	10	*MB*	25183.182			3976.070	10	*MB*	25143.350	$2563°_{5\frac{1}{2}} - 27706_{6\frac{1}{2}}$	−47
3969.947	3	*MB*	25182.129			3976.140	3	*MB*	25142.907		
3970.042	110	*MB*	25181.526	$11742°_{5\frac{1}{2}} - 36923_{4\frac{1}{2}}$	−17	3976.689	10	*MB*	25139.436	$4844°_{1\frac{1}{2}} - 29984_{1\frac{1}{2}}$	29
3970.147	3	*MB*	25180.860			3976.778	50	*MB*	25138.874	$7059°_{4\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−35
3970.439	40	*MB*	25179.008	$9634°_{1\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−7	3976.831	4	*MB*	25138.539		
3970.542	5	*MB*	25178.355			3977.002	10	*MB*	25137.458		
3970.644	120	*MB*	25177.708	$2634°_{2\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−23	3977.073	6	*MB*	25137.009	$10088°_{1\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−6
3970.786	10	*MB*	25176.808	$2634°_{2\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−21	3977.106	12	*MB*	25136.800	$3593°_{4\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−29
3971.019	10	*MB*	25175.331	$12057°_{2\frac{1}{2}} - 37232_{1\frac{1}{2}}$	0	3977.289	8	*MB*	25135.644		
3971.202	2	*MB*	25174.171			3977.527	25	*MB*	25134.140	$8774_{4\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	11
3971.248	9	*MB*	25173.879	$8702°_{1\frac{1}{2}} - 33876_{1\frac{1}{2}}$	−53	3977.646	2	*MB*	25133.388		
3971.405	8	*MB*	25172.884	$8804°_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−31	3977.739	45	*MB*	25132.800	$5942°_{3\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−4
3971.683	320	*MB*	25171.122	$3995°_{3\frac{1}{2}} - 29166_{4\frac{1}{2}}$	−14	3977.808	65	*MB*	25132.364	$2382°_{4\frac{1}{2}} - 27514_{3\frac{1}{2}}$	−49
3971.725	12	*MB*	25170.856	$2641°_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	17	3977.841	7	*MB*	25132.156		
3971.794	8	*MB*	25170.419			3978.226	5	*MB*	25129.724	$11007°_{1\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−80
3971.874	80	*MB*	25169.911	$2641°_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−25	3978.340	9	*MB*	25129.004	$8280°_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	53
3972.070	190	*MB*	25168.670	$6389°_{4\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−13	3978.486	7	*MB*	25128.082		
3972.371	7	*MB*	25166.763	$7878°_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−3	3978.646	550	*MB*	25127.071	$4322°_{2\frac{1}{2}} - 29449_{1\frac{1}{2}}$	1
3972.500	5	*MB*	25165.945			3978.746	3	*MB*	25126.440		
3972.583	8	*MB*	25165.420			3978.884	10	*MB*	25125.568		
3972.638	6	*MB*	25165.071			3979.297	2	*MB*	25122.961		
3972.761	10	*MB*	25164.292			3979.722	2	*MB*	25120.278		
3972.821	6	*MB*	25163.912			3979.796	10	*MB*	25119.811		
3972.888	4	*MB*	25163.488			3979.941	15	*MB*	25118.895	$5924°_{1\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−10
3972.954	8	*MB*	25163.070	$7722_{2\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	−11	3980.258	12	*MB*	25116.895	$8927°_{5\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−31
3973.046	50	*MB*	25162.487	$4511°_{2\frac{1}{2}} - 29673_{2\frac{1}{2}}$	−25	3980.307	7	*MB*	25116.586	$7746°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	4
3973.194	9	*MB*	25161.550			3980.451	8	*MB*	25115.677	$7522°_{0\frac{1}{2}} - 32638_{1\frac{1}{2}}$	−29
										$7202°_{2\frac{1}{2}} - 32318_{3\frac{1}{2}}$	31
3973.263	2	*MB*	25161.113								
3973.333	3	*MB*	25160.669			3980.890	400	*MB*	25112.907	$5716°_{3\frac{1}{2}} - 30829_{3\frac{1}{2}}$	0
3973.385	5	*MB*	25160.340			3981.234	8	*MB*	25110.738	$10114°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−34
3973.498	10	*MB*	25159.625							$5964°_{3\frac{1}{2}} - 31075_{4\frac{1}{2}}$	31
3973.643	1	*MB*	25158.707			3981.590	5	*MB*	25108.493	$5924°_{1\frac{1}{2}} - 31032_{0\frac{1}{2}}$	86
3973.917	25b	*MB*	25156.972			3981.723	10	*MB*	25107.654	$13784°_{1\frac{1}{2}} - 38892_{0\frac{1}{2}}$	−12
3974.096	9	*MB*	25155.839	$15517°_{6\frac{1}{2}} - 40673_{5\frac{1}{2}}$	36	3981.893	30	*MB*	25106.582	$5969°_{5\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−13
3974.200	50	*MB*	25155.181	$5010°_{2\frac{1}{2}} - 30166_{3\frac{1}{2}}$	−5	3982.009	3	*MB*	25105.851	$8702°_{1\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−21
3974.336	2	*MT*	25154.320	$7259°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	49	3982.098	2	*MB*	25105.289		
3974.495	10	*MB*	25153.314	$5675°_{4\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−46	3982.248	15	*MB*	25104.344	$7722_{2\frac{1}{2}} - 32826°_{1\frac{1}{2}}$	−38
3974.549	12	*MB*	25152.972	$13784°_{1\frac{1}{2}} - 38937_{1\frac{1}{2}}$	−9	3982.376	10	*MB*	25103.537		
3974.622	6	*MB*	25152.510			3982.898	400	*MB*	25100.247	$6638°_{4\frac{1}{2}} - 31738_{5\frac{1}{2}}$	21
3974.740	3	*MB*	25151.763			3983.007	1	*MB*	25099.560	$0°_{3\frac{1}{2}} - 25099_{1\frac{1}{2}}$	78
3974.912	9	*MB*	25150.675			3983.210	11	*MB*	25098.281	$4266°_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−61
3974.983	1	*MB*	25150.226	$13659°_{4\frac{1}{2}} - 38809_{3\frac{1}{2}}$	79	3983.288	220	*MB*	25097.789	$4165_{4\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	2

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3983.325	80	*MB*	25097.556	$16192°_{4\frac{1}{2}} - 41289_{5\frac{1}{2}}$	52	3991.921	8	*MB*	25043.514		
3983.388	4	*MB*	25097.159	$9198°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	36	3992.125	50	*MB*	25042.234	$7818°_{1\frac{1}{2}} - 32860_{0\frac{1}{2}}$	28
3983.652	2	*MB*	25095.496			3992.381	500	*MB*	25040.628	$3593°_{4\frac{1}{2}} - 28634_{5\frac{1}{2}}$	−5
3983.722	2	*MB*	25095.055			3992.710	30	*MB*	25038.565		
3983.848	2	*MB*	25094.262			3992.906	260	*MB*	25037.336	$5924°_{1\frac{1}{2}} - 30961_{1\frac{1}{2}}$	22
3984.103	3	*MB*	25092.656			3992.986	4	*MB*	25036.834		
3984.312	15	*MB*	25091.339			3993.152	12	*MB*	25035.794		
3984.671	550	*MB*	25089.079	$7713°_{4\frac{1}{2}} - 32802_{5\frac{1}{2}}$	3	3993.189	12	*MB*	25035.562	$7278°_{1\frac{1}{2}} - 32314_{0\frac{1}{2}}$	15
3984.778	3	*MB*	25088.405			3993.403	15	*MB*	25034.220	$9778°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	4
3985.005	10	*MB*	25086.976	$8448_{2\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	−18	3993.818	650	*MB*	25031.619	$7341_{5\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	5
3985.650	6	*MB*	25082.916	$10114°_{2\frac{1}{2}} - 35197_{1\frac{1}{2}}$	−40	3993.907	2	*MB*	25031.061		
3985.933	15	*MB*	25081.135	$20783_{5\frac{1}{2}} - 45864°_{5\frac{1}{2}}$	−22	3994.059	1	*MB*	25030.108		
3986.019	12	*MB*	25080.594			3994.226	2	*MB*	25029.062		
3986.404	40	*MB*	25078.172	$5964°_{3\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−41	3994.462	12	*MB*	25027.583		
3986.624	3	*MB*	25076.788	$13117_{4\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	−17	3994.541	12	*MB*	25027.088	$3703°_{3\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−29
3986.734	10	*MB*	25076.096			3994.584	80	*MB*	25026.819	$5675°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	−27
3986.876	1	*MB*	25075.203			3994.646	10	*MB*	25026.430	$1873°_{3\frac{1}{2}} - 26900_{3\frac{1}{2}}$	11
3986.978	4	*MB*	25074.562			3994.719	4	*MB*	25025.973	$13515°_{3\frac{1}{2}} - 38541_{4\frac{1}{2}}$	−46
3987.067	10	*MB*	25074.002	$13758°_{1\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−36	3994.802	15	*MB*	25025.453	$2879°_{5\frac{1}{2}} - 27905_{4\frac{1}{2}}$	−8
3987.213	6	*MB*	25073.084			3995.031	3	*MB*	25024.019		
3987.513	6	*MB*	25071.198	$2879°_{5\frac{1}{2}} - 27950_{5\frac{1}{2}}$	2	3995.107	10	*MB*	25023.543		
3987.708	3	*MB*	25069.972			3995.238	5	*MB*	25022.722		
3988.026	5	*MB*	25067.973			3995.391	6	*MB*	25021.764	$12057°_{2\frac{1}{2}} - 37078_{1\frac{1}{2}}$	−7
3988.142	10	*MB*	25067.243			3995.425	25	*MB*	25021.551	$3703°_{3\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−2
3988.266	10	*MB*	25066.464			3995.539	10	*MB*	25020.837	$18147°_{2\frac{1}{2}} - 43167_{1\frac{1}{2}}$	−37
3988.385	2	*MB*	25065.716			3995.599	1	*MB*	25020.461		
3988.498	5	*MB*	25065.006			3995.752	8	*MB*	25019.503		
3988.570	4	*MB*	25064.554			3996.145	5	*MB*	25017.043		
3988.625	8	*MB*	25064.208	$12466°_{1\frac{1}{2}} - 37530_{1\frac{1}{2}}$	5	3996.353	10	*MB*	25015.741		
3988.735	3	*MB*	25063.517	$23267_{3\frac{1}{2}} - 48330°_{3\frac{1}{2}}$	78	3996.473	50	*MB*	25014.990	$4266°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	13
3988.849	3	*MB*	25062.801			3996.765	12	*MB*	25013.162	$13515°_{3\frac{1}{2}} - 38529_{2\frac{1}{2}}$	−5
3988.903	6	*MB*	25062.461	$8531_{3\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	−12	3996.888	4	*MB*	25012.392		
3989.099	2	*MB*	25061.230			3997.026	2	*MB*	25011.529	$8896_{5\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	65
3989.277	20	*MB*	25060.112			3997.108	2	*MB*	25011.016		
3989.440	260	*MB*	25059.088	$7259°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−11	3997.172	1	*MB*	25010.615		
3989.519	5	*MB*	25058.591			3997.270	12	*MB*	25010.002	$5819°_{4\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−8
3989.551	2	*MB*	25058.391			3997.471	35	*MB*	25008.745	$6549°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	27
3989.751	25	*MB*	25057.134	$4737°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−9	3997.671	8	*MB*	25007.493	$8169°_{1\frac{1}{2}} - 33177_{0\frac{1}{2}}$	−4
3989.823	2	*MB*	25056.682			3997.714	100	*MB*	25007.224	$8402°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−4
3989.879	2	*MB*	25056.331			3998.234	10	*MB*	25003.972	$8531_{3\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	14
3990.100	130	*MB*	25054.943	$2879°_{5\frac{1}{2}} - 27934_{4\frac{1}{2}}$	0	3998.344	3	*MB*	25003.284		
3990.203	1	*MB*	25054.296	$5010°_{2\frac{1}{2}} - 30065_{3\frac{1}{2}}$	2	3998.395	5	*MB*	25002.965	$10454°_{1\frac{1}{2}} - 35457_{1\frac{1}{2}}$	−80
3990.416	20	*MB*	25052.959	$5616_{4\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	−3	3998.524	2	*MB*	25002.159		
3990.620	4	*MB*	25051.678			3998.739	6	*MB*	25000.814	$10924°_{4\frac{1}{2}} - 35925_{3\frac{1}{2}}$	9
3990.689	50	*MB*	25051.245	$5651°_{5\frac{1}{2}} - 30702_{4\frac{1}{2}}$	−7	3999.015	4	*MB*	24999.089		
3990.857	8	*MB*	25050.190			3999.080	1	*MB*	2499*B* 251		
3991.127	10	*MB*	25048.496			3999.237	2000	*MB*	24997.701	$2382°_{4\frac{1}{2}} - 27379_{5\frac{1}{2}}$	−1
3991.222	15	*MB*	25047.900	$13784°_{1\frac{1}{2}} - 38832_{2\frac{1}{2}}$	25	3999.339	10	*MB*	24997.064		
3991.322	40	*MB*	25047.272	$5118°_{2\frac{1}{2}} - 30166_{3\frac{1}{2}}$	21	3999.439	3	*MB*	24996.439		
3991.520	2	*MB*	25046.030			3999.478	3	*MB*	24996.195		

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
3999.543	2	*MB*	24995.789			4006.774	5	*MB*	24950.680	$10274°_{3\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−4
3999.656	12	*MB*	24995.083			4007.070	15	*MB*	24948.837		
4000.063	6	*MB*	24992.539			4007.301	1	*MB*	24947.399		
4000.384	12	*MB*	24990.534			4007.474	50	*MB*	24946.322	$15529_{2\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	−26
4000.439	2	*MB*	24990.191							$5118°_{2\frac{1}{2}} - 30065_{3\frac{1}{2}}$	−35
4000.594	4	*MB*	24989.222			4007.587	150	*MB*	24945.619	$4844°_{1\frac{1}{2}} - 29790_{0\frac{1}{2}}$	−6
4000.680	12	*MB*	24988.685	$9778°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	−19	4007.849	4	*MB*	24943.988	$1873°_{3\frac{1}{2}} - 26817_{2\frac{1}{2}}$	−13
4000.786	12	*MB*	24988.023	$5437°_{3\frac{1}{2}} - 30425_{2\frac{1}{2}}$	96	4008.401	10	*MB*	24940.553		
4001.046	80	*MB*	24986.399	$5716°_{3\frac{1}{2}} - 30702_{4\frac{1}{2}}$	6	4008.446	12	*MB*	24940.273	$3745°_{1\frac{1}{2}} - 28685_{2\frac{1}{2}}$	−9
4001.276	6	*MB*	24984.963	$7522°_{0\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−20	4008.581	4	*MB*	24939.433		
4001.322	5	*MB*	24984.676			4008.597	5	*MB*	24939.333		
4001.360	7	*MB*	24984.439	$7878°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	0	4008.663	30	*MB*	24938.923	$7259°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	16
4001.492	30	*MB*	24983.614	$20881_{6\frac{1}{2}} - 45864°_{5\frac{1}{2}}$	0	4008.714	2	*MB*	24938.606		
4001.562	160	*MB*	24983.177	$5010°_{2\frac{1}{2}} - 29994_{2\frac{1}{2}}$	7	4008.741	8	*MB*	24938.438	$4511°_{2\frac{1}{2}} - 29449_{1\frac{1}{2}}$	−82
4001.724	100	*MB*	24982.166	$3703°_{3\frac{1}{2}} - 28685_{2\frac{1}{2}}$	2	4009.018	20	*MB*	24936.715		
4001.867	6	*MB*	24981.273			4009.115	40	*MB*	24936.111	$12260°_{3\frac{1}{2}} - 37196_{4\frac{1}{2}}$	60
4001.887	5	*MB*	24981.148							$7202°_{2\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−57
4001.983	1	*MB*	24980.549			4009.287	3	*MB*	24935.041		
4002.106	1	*MB*	24979.782			4009.449	4	*MB*	24934.034	$3363°_{2\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−11
4002.251	10	*MB*	24978.877	$8169°_{1\frac{1}{2}} - 33148_{2\frac{1}{2}}$	−13	4009.553	5	*MB*	24933.387	$2581°_{4\frac{1}{2}} - 27514_{3\frac{1}{2}}$	−15
4002.304	4	*MB*	24978.546			4009.598	4	*MB*	24933.107		
4002.553	3	*MB*	24976.992			4009.998	5	*MB*	24930.620		
4002.594	3	*MB*	24976.736	$13217_{3\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	−15	4010.016	8	*MB*	24930.508		
4002.740	3	*MB*	24975.825			4010.136	100	*MB*	24929.762	$6638°_{4\frac{1}{2}} - 31568_{4\frac{1}{2}}$	2
4002.827	130	*MB*	24975.282	$7293°_{6\frac{1}{2}} - 32269_{7\frac{1}{2}}$	−31	4010.176	4	*MB*	24929.514		
4002.936	9	*MB*	24974.602	$11949°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	2	4010.755	6	*MB*	24925.915		
4002.969	80	*MB*	24974.396	$3363°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	9	4010.789	7	*MB*	24925.704	$16159°_{3\frac{1}{2}} - 41085_{3\frac{1}{2}}$	26
4003.160	80	*MB*	24973.205	$5010°_{2\frac{1}{2}} - 29984_{1\frac{1}{2}}$	23	4010.978	2	*MB*	24924.529		
4003.392	2	*MB*	24971.758			4011.102	6	*MB*	24923.759	$16159°_{3\frac{1}{2}} - 41083_{4\frac{1}{2}}$	1
4003.600	12	*MB*	24970.460	$7746°_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	−1	4011.119	10	*MB*	24923.653		
4003.676	5	*MB*	24969.986			4011.224	2	*MB*	24923.000		
4003.769	650	*MB*	24969.406	$7522°_{5\frac{1}{2}} - 32492_{5\frac{1}{2}}$	−10	4011.385	1	*MB*	24922.000		
4003.874	4	*MB*	24968.751			4011.557	70	*MB*	24920.932	$5716°_{3\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−8
4004.032	40	*MB*	24967.766	$16133_{2\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	28	4011.737	4	*MB*	24919.814		
4004.083	10	*MB*	24967.448	$1873°_{3\frac{1}{2}} - 26841_{4\frac{1}{2}}$	−1	4012.042	8	*MB*	24917.919		
4004.132	10	*MB*	24967.143			4012.150	15	*MB*	24917.249	$10641°_{2\frac{1}{2}} - 35558_{3\frac{1}{2}}$	−10
4004.151	15	*MB*	24967.024			4012.387	1900	*MB*	24915.777	$4523°_{4\frac{1}{2}} - 29438_{5\frac{1}{2}}$	−6
4004.580	70	*MB*	24964.350	$7233°_{5\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−4	4012.595	3	*MB*	24914.485		
4004.843	15	*MB*	24962.710			4012.627	2	*MB*	24914.287		
4005.009	2	*MB*	24961.676	$13012°_{2\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−4	4012.771	3	*MB*	24913.393		
4005.152	3	*MB*	24960.784			4012.919	5	*MB*	24912.474		
4005.498	8	*MB*	24958.628	$4322°_{2\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−37	4013.032	1	*MB*	24911.772	$19982_{4\frac{1}{2}} - 44893°_{3\frac{1}{2}}$	21
4005.536	4	*MB*	24958.391			4013.221	6	*MB*	24910.599		
4005.634	260	*MB*	24957.781	$987°_{4\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−3	4013.523	4	*MB*	24908.725	$14963°_{5\frac{1}{2}} - 39871_{4\frac{1}{2}}$	−7
4005.757	8	*MB*	24957.014	$9198°_{3\frac{1}{2}} - 34155_{3\frac{1}{2}}$	30	4013.617	15	*MB*	24908.141		
4005.874	2	*MB*	24956.286			4014.057	2	*MB*	24905.411		
4006.286	40	*MB*	24953.719			4014.077	3	*MB*	24905.287		
4006.468	5	*MB*	24952.586			4014.151	12	*MB*	24904.828	$4459°_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−39
4006.586	7	*MB*	24951.851			4014.201	3	*MB*	24904.518		
4006.604	10	*MB*	24951.739			4014.234	2	*MB*	24904.313		

501-968 O - 73 - 8

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4014.344	10	*MB*	24903.631	$8175°_{2\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−17	4021.421	10	*MB*	24859.805	$7278°_{1\frac{1}{2}} - 32138_{2\frac{1}{2}}$	30
4014.606	3	*MB*	24902.005			4021.712	2	*MB*	24858.007	$8131_{4\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	6
4014.675	2	*MB*	24901.577			4021.744	2	*MB*	24857.809		
4014.716	4	*MB*	24901.323			4021.989	2	*MB*	24856.295		
4014.897	650	*MB*	24900.201	$4266°_{3\frac{1}{2}} - 29166_{4\frac{1}{2}}$	1	4022.095	5	*MB*	24855.640		
4015.174	10	*MB*	24898.483	$7818°_{1\frac{1}{2}} - 32716_{2\frac{1}{2}}$	−16	4022.177	2	*MB*	24855.133		
4015.544	5	*MB*	24896.189	$9269°_{0\frac{1}{2}} - 34166_{1\frac{1}{2}}$	−23	4022.269	170	*MB*	24854.565	$9053_{3\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	1
4015.718	10	*MB*	24895.110	$11949°_{3\frac{1}{2}} - 36844_{2\frac{1}{2}}$	−5	4022.443	20	*MB*	24853.489	$4511°_{2\frac{1}{2}} - 29364_{3\frac{1}{2}}$	7
4015.823	5	*MB*	24894.459			4022.509	2	*MB*	24853.082		
4015.877	180	*MB*	24894.124	$8402°_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−12	4022.769	12	*MB*	24851.475	$6517°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	2
4016.022	6	*MB*	24893.226	$10035°_{5\frac{1}{2}} - 34928_{4\frac{1}{2}}$	−31	4022.979	12	*MB*	24850.178	$8702°_{1\frac{1}{2}} - 33552_{2\frac{1}{2}}$	40
4016.061	10	*MB*	24892.984			4023.106	2	*MB*	24849.394		
4016.106	20	*MB*	24892.705	$16192°_{4\frac{1}{2}} - 41085_{3\frac{1}{2}}$	−42	4023.164	3	*MB*	24849.036		
4016.225	8	*MB*	24891.967	$7746°_{2\frac{1}{2}} - 32638_{1\frac{1}{2}}$	−12	4023.369	25	*MB*	24847.769	$6521°_{1\frac{1}{2}} - 31369_{2\frac{1}{2}}$	9
4016.423	7	*MB*	24890.740	$16192°_{4\frac{1}{2}} - 41083_{4\frac{1}{2}}$	−87	4023.637	12	*MB*	24846.114	$9198°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	0
4016.472	6	*MB*	24890.436			4023.699	6	*MB*	24845.732	$10088°_{1\frac{1}{2}} - 34934_{2\frac{1}{2}}$	−50
4016.537	2	*MB*	24890.034	$9269°_{0\frac{1}{2}} - 34159_{0\frac{1}{2}}$	−16	4023.979	7	*MB*	24844.003		
4016.710	3	*MB*	24888.962			4024.118	3	*MB*	24843.145		
4016.772	1	*MB*	24888.578			4024.349	100	*MB*	24841.719	$4523°_{4\frac{1}{2}} - 29364_{3\frac{1}{2}}$	12
4017.060	2	*MB*	24886.793			4024.487	600	*MB*	24840.867	$3793°_{6\frac{1}{2}} - 28634_{5\frac{1}{2}}$	−14
4017.135	12	*MB*	24886.329	$5942°_{3\frac{1}{2}} - 30829_{3\frac{1}{2}}$	3	4024.532	6	*MB*	24840.589		
4017.500	15	*MB*	24884.068	$8927°_{5\frac{1}{2}} - 33811_{4\frac{1}{2}}$	15	4024.595	3	*MB*	24840.200		
4017.591	100	*MB*	24883.504	$5819°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	7	4024.746	4	*MB*	24839.268		
4017.748	7	*MB*	24882.532	$13659°_{4\frac{1}{2}} - 38541_{4\frac{1}{2}}$	−11	4024.881	1	*MB*	24838.435		
4017.869	4	*MB*	24881.782			4024.919	7	*MB*	24838.201		
4017.951	5	*MB*	24881.275			4025.142	170	*MB*	24836.825	$3508°_{0\frac{1}{2}} - 28345_{0\frac{1}{2}}$	−20
4018.012	7	*MB*	24880.897			4025.305	25	*MB*	24835.819		
4018.061	12	*MB*	24880.593	$8169°_{1\frac{1}{2}} - 33050_{1\frac{1}{2}}$	1	4025.454	2	*MB*	24834.900		
4018.158	10	*MB*	24879.993	$2634°_{2\frac{1}{2}} - 27514_{3\frac{1}{2}}$	0	4025.622	3	*MB*	24833.863		
4018.218	15	*MB*	24879.621	$7259°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−1	4025.888	25	*MB*	24832.223	$16268_{1\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	−35
4018.384	15	*MB*	24878.594	$7059°_{4\frac{1}{2}} - 31937_{3\frac{1}{2}}$	13	4025.981	1	*MB*	24831.649		
4018.438	2	*MB*	24878.259			4026.251	12	*MB*	24829.984		
4018.900	6	*MB*	24875.399	$8169°_{1\frac{1}{2}} - 33045_{2\frac{1}{2}}$	3	4026.388	10	*MB*	24829.139	$4844°_{1\frac{1}{2}} - 29673_{2\frac{1}{2}}$	13
4018.926	2	*MB*	24875.239	$5118°_{2\frac{1}{2}} - 29994_{2\frac{1}{2}}$	4	4026.663	2	*MB*	24827.443	$4201°_{1\frac{1}{2}} - 29029_{1\frac{1}{2}}$	−16
4019.050	140	*MB*	24874.471	$8175°_{2\frac{1}{2}} - 33050_{1\frac{1}{2}}$	43	4026.750	3	*MB*	24826.907	$2879°_{5\frac{1}{2}} - 27706_{6\frac{1}{2}}$	−28
4019.268	20	*MB*	24873.122	$2641°_{3\frac{1}{2}} - 27514_{3\frac{1}{2}}$	21	4026.789	3	*MB*	24826.666		
4019.470	20	*MB*	24871.872	$7059°_{4\frac{1}{2}} - 31930_{4\frac{1}{2}}$	8	4026.925	12	*MB*	24825.828	$12762°_{4\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−3
4019.794	2	*MB*	24869.867			4027.044	50	*MB*	24825.094	$6913°_{6\frac{1}{2}} - 31738_{5\frac{1}{2}}$	3
4019.894	100	*MB*	24869.249	$8175°_{2\frac{1}{2}} - 33045_{2\frac{1}{2}}$	17	4027.203	8	*MB*	24824.114		
4020.002	12	*MB*	24868.580			4027.628	20	*MB*	24821.495	$4459°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−6
4020.152	7	*MB*	24867.653	$8280°_{2\frac{1}{2}} - 33148_{2\frac{1}{2}}$	10	4027.691	120	*MB*	24821.107	$17171°_{5\frac{1}{2}} - 41992_{6\frac{1}{2}}$	−3
4020.254	8	*MB*	24867.022							$5924°_{1\frac{1}{2}} - 30745_{1\frac{1}{2}}$	25
4020.349	4	*MB*	24866.434			4027.867	30	*MB*	24820.022	$7818°_{1\frac{1}{2}} - 32638_{1\frac{1}{2}}$	4
4020.543	15	*MB*	24865.234	$5118°_{2\frac{1}{2}} - 29984_{1\frac{1}{2}}$	−11	4027.998	30	*MB*	24819.215	$6549°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	30
4020.645	2	*MB*	24864.603			4028.199	20	*MB*	24817.976	$6389°_{4\frac{1}{2}} - 31207_{3\frac{1}{2}}$	−8
4020.718	3	*MB*	24864.152	$5964°_{3\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−75	4028.404	600	*MB*	24816.713	$2563°_{5\frac{1}{2}} - 27379_{5\frac{1}{2}}$	−2
4020.745	3	*MB*	24863.985			4028.537	20	*MB*	24815.894	$10641°_{2\frac{1}{2}} - 35457_{1\frac{1}{2}}$	18
4020.932	12	*MB*	24862.829			4028.707	5	*MB*	24814.847	$11387°_{3\frac{1}{2}} - 36202_{4\frac{1}{2}}$	21
4021.075	10	*MB*	24861.945	$11340°_{3\frac{1}{2}} - 36202_{4\frac{1}{2}}$	−13	4028.810	2	*MB*	24814.213		
4021.366	2	*MB*	24860.146			4028.948	5	*MB*	24813.363		

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4029.032	2	*MB*	24812.845			4036.105	10	*MB*	24769.363	$8280°_{2\frac{1}{2}}-33050_{1\frac{1}{2}}$	19
4029.257	30	*MB*	24811.460			4036.242	10	*MB*	24768.523		
4029.566	1	*MB*	24809.557			4036.462	10	*MB*	24767.173		
4029.681	8	*MB*	24808.849			4036.499	30	*MB*	24766.946		
4029.749	15	*MB*	24808.431	$5437°_{3\frac{1}{2}}-30245_{4\frac{1}{2}}$	−24	4036.645	5	*MB*	24766.050	$12466°_{1\frac{1}{2}}-37232_{1\frac{1}{2}}$	42
4030.157	40	*MB*	24805.919	$10114°_{2\frac{1}{2}}-34920_{3\frac{1}{2}}$	14	4036.832	2	*MB*	24764.903		
4030.342	180	*MB*	24804.781	$8789_{2\frac{1}{2}}-33594°_{2\frac{1}{2}}$	9	4036.965	15	*MB*	24764.087	$8280°_{2\frac{1}{2}}-33045_{2\frac{1}{2}}$	−61
				$2382°_{4\frac{1}{2}}-27187_{3\frac{1}{2}}$	−19	4037.277	3	*MB*	24762.173		
4030.456	2	*MB*	24804.079			4037.377	40	*MB*	24761.560	$8774_{4\frac{1}{2}}-33535°_{3\frac{1}{2}}$	−11
4030.502	2	*MB*	24803.796			4037.661	240	*MB*	24759.818	$5942°_{3\frac{1}{2}}-30702_{4\frac{1}{2}}$	6
4030.587	2	*MB*	24803.273	$10058_{6\frac{1}{2}}-34861°_{5\frac{1}{2}}$	−26	4037.766	3	*MB*	24759.174		
4030.744	20	*MB*	24802.307			4037.925	3	*MB*	24758.199		
4030.985	20	*MB*	24800.824			4037.972	10	*MB*	24757.911	$15281_{6\frac{1}{2}}-40039°_{6\frac{1}{2}}$	−10
4031.142	1	*MB*	24799.858			4038.255	120	*MB*	24756.176	$10869_{4\frac{1}{2}}-35625°_{3\frac{1}{2}}$	18
4031.178	3	*MB*	24799.637			4038.751	5	*MB*	24753.136		
4031.332	600	*MB*	24798.689	$2581°_{4\frac{1}{2}}-27379_{5\frac{1}{2}}$	−2	4038.818	1	*MB*	24752.725		
4031.429	3	*MB*	24798.092			4038.902	1	*MB*	24752.211		
4031.500	5	*MB*	24797.656			4039.068	8	*MB*	24751.193		
4031.608	12	*MB*	24796.992	$11340°_{3\frac{1}{2}}-36137_{2\frac{1}{2}}$	−13	4039.193	2	*MB*	24750.427		
4031.686	5	*MB*	24796.512			4039.285	10	*MB*	24749.864	$11387°_{3\frac{1}{2}}-36137_{2\frac{1}{2}}$	−8
4031.737	5	*MB*	24796.198	$5010°_{2\frac{1}{2}}-29807_{3\frac{1}{2}}$	−9	4039.502	1	*MB*	24748.534		
4031.773	2	*MB*	24795.977			4039.527	4	*MB*	24748.381		
4032.004	5	*MB*	24794.556			4039.723	5	*MB*	24747.180		
4032.036	4	*MB*	24794.359			4039.873	60	*MB*	24746.261	$8789_{2\frac{1}{2}}-33535°_{3\frac{1}{2}}$	6
4032.167	4	*MB*	24793.555			4039.927	15	*MB*	24745.931	$8402°_{3\frac{1}{2}}-33148_{2\frac{1}{2}}$	10
4032.252	7	*MB*	24793.031			4040.187	5	*MB*	24744.338		
4032.373	6	*MB*	24792.287	$13012°_{2\frac{1}{2}}-37804_{1\frac{1}{2}}$	−51	4040.210	2	*MB*	24744.197	$13784°_{1\frac{1}{2}}-38529_{2\frac{1}{2}}$	11
4032.417	3	*MB*	24792.017	$7522°_{0\frac{1}{2}}-32314_{0\frac{1}{2}}$	6	4040.304	1	*MB*	24743.622	$10454°_{1\frac{1}{2}}-35197_{1\frac{1}{2}}$	54
4032.451	4	*MB*	24791.808	$9634°_{1\frac{1}{2}}-34426_{2\frac{1}{2}}$	−42	4040.398	2	*MB*	24743.046		
4032.548	20	*MB*	24791.211	$10924°_{4\frac{1}{2}}-35716_{5\frac{1}{2}}$	5	4040.439	2	*MB*	24742.795		
4032.592	6	*MB*	24790.941			4040.524	3	*MB*	24742.274		
4032.810	1	*MB*	24789.601			4040.579	2	*MB*	24741.938		
4032.952	2	*MB*	24788.728			4040.752	1500	*MB*	24740.878	$3593°_{4\frac{1}{2}}-28334_{4\frac{1}{2}}$	5
4033.006	5	*MB*	24788.396			4040.854	6	*MB*	24740.254		
4033.194	5	*MB*	24787.241	$12057°_{2\frac{1}{2}}-36844_{2\frac{1}{2}}$	43	4041.206	5	*MB*	24738.099	$14097_{3\frac{1}{2}}-38835°_{2\frac{1}{2}}$	59
4033.276	2	*MB*	24786.737			4041.267	80	*MB*	24737.726	$5964°_{3\frac{1}{2}}-30702_{4\frac{1}{2}}$	12
4033.349	10	*MB*	24786.288	$11325°_{2\frac{1}{2}}-36112_{3\frac{1}{2}}$	48	4041.336	10	*MB*	24737.303		
4033.606	2	*MB*	24784.709			4041.361	10	*MB*	24737.150		
4033.750	5	*MB*	24783.824			4041.383	3	*MB*	24737.016	$9269°_{0\frac{1}{2}}-34006_{0\frac{1}{2}}$	20
4033.780	15	*MB*	24783.640	$5010°_{2\frac{1}{2}}-29794_{3\frac{1}{2}}$	−6	4041.694	3	*MB*	24735.112	$7202°_{2\frac{1}{2}}-31937_{3\frac{1}{2}}$	−11
4034.033	1	*MB*	24782.085			4041.740	4	*MB*	24734.831		
4034.152	3	*MB*	24781.354			4042.028	1	*MB*	24733.068	$8131_{4\frac{1}{2}}-32864°_{5\frac{1}{2}}$	8
4034.694	6	*MB*	24778.026			4042.127	40	*MB*	24732.463	$8927°_{5\frac{1}{2}}-33659_{5\frac{1}{2}}$	9
4035.158	2	*MB*	24775.176			4042.578	650	*MB*	24729.703	$3995°_{3\frac{1}{2}}-28725_{4\frac{1}{2}}$	16
4035.364	10	*MB*	24773.912			4042.781	12	*MB*	24728.462		
4035.415	2	*MB*	24773.599			4042.902	5	*MB*	24727.722		
4035.531	12	*MB*	24772.887	$10684°_{0\frac{1}{2}}-35457_{1\frac{1}{2}}$	10	4043.034	3	*MB*	24726.914		
4035.765	3	*MB*	24771.450	$11340°_{3\frac{1}{2}}-36112_{3\frac{1}{2}}$	27	4043.473	20	*MB*	24724.230	$5455°_{7\frac{1}{2}}-30180_{6\frac{1}{2}}$	−20
4035.887	8	*MB*	24770.701			4043.560	8	*MB*	24723.698		
4035.980	8	*MB*	24770.131	$4511°_{2\frac{1}{2}}-29281_{2\frac{1}{2}}$	14	4043.577	5	*MB*	24723.594		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4043.997	9	*MB*	24721.026			4052.054	20	*MB*	24671.873	$7259°_{3\frac{1}{2}} - 31930_{4\frac{1}{2}}$	12
4044.373	1	*MB*	24718.728			4052.280	12	*MB*	24670.497		
4044.564	8	*MB*	24717.561			4052.456	1	*MB*	24669.425		
4044.802	2	*MB*	24716.106			4052.628	12	*MB*	24668.378	$9491°_{0\frac{1}{2}} - 34159_{0\frac{1}{2}}$	−5
4045.128	3	*MB*	24714.114			4052.702	10	*MB*	24667.928	$13784°_{1\frac{1}{2}} - 38452_{1\frac{1}{2}}$	12
4045.217	160	*MB*	24713.571	$6521°_{1\frac{1}{2}} - 31234_{2\frac{1}{2}}$	24	4052.775	10	*MB*	24667.483	$13527_{4\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	−5
4045.318	60	*MB*	24712.954	$5924°_{1\frac{1}{2}} - 30637_{2\frac{1}{2}}$	1	4052.824	8	*MB*	24667.185	$7746°_{2\frac{1}{2}} - 32413_{3\frac{1}{2}}$	25
4045.407	15	*MB*	24712.410	$4737°_{2\frac{1}{2}} - 29449_{1\frac{1}{2}}$	5	4053.066	15	*MB*	24665.712	$16192°_{4\frac{1}{2}} - 40858_{4\frac{1}{2}}$	−26
4045.474	2	*MB*	24712.001			4053.268	2	*MB*	24664.483		
4045.609	8	*MB*	24711.176			4053.500	500	*MB*	24663.072	$0°_{3\frac{1}{2}} - 24663_{4\frac{1}{2}}$	17
4045.944	25	*MB*	24709.130	$5716°_{3\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−2	4054.092	12	*MB*	24659.470	$10274°_{3\frac{1}{2}} - 34934_{2\frac{1}{2}}$	18
4046.028	12	*MB*	24708.617			4054.205	10	*MB*	24658.783	$10798°_{2\frac{1}{2}} - 35457_{1\frac{1}{2}}$	20
4046.129	50	*MB*	24708.000			4054.333	10	*MB*	24658.004	$6549°_{2\frac{1}{2}} - 31207_{3\frac{1}{2}}$	−14
4046.337	440	*MB*	24706.730	$4459°_{3\frac{1}{2}} - 29166_{4\frac{1}{2}}$	6	4054.424	4	*MB*	24657.451	$20940_{3\frac{1}{2}} - 45598°_{3\frac{1}{2}}$	−10
4046.737	10	*MB*	24704.288	$7061°_{0\frac{1}{2}} - 31766_{1\frac{1}{2}}$	18	4054.478	4	*MB*	24657.123		
4046.850	15	*MB*	24703.598	$3593°_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	8	4054.787	8	*MB*	24655.244		
4047.176	5	*MB*	24701.609			4054.898	2	*MB*	24654.569		
4047.269	90	*MB*	24701.041	$5283°_{0\frac{1}{2}} - 29984_{1\frac{1}{2}}$	18	4054.987	320	*MB*	24654.028	$2595°_{1\frac{1}{2}} - 27249_{2\frac{1}{2}}$	3
4047.396	15	*MB*	24700.266	$7713°_{4\frac{1}{2}} - 32413_{3\frac{1}{2}}$	9	4055.185	60	*MB*	24652.824	$10114°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	16
4047.565	1	*MB*	24699.235			4055.708	10	*MB*	24649.645		
4047.616	12	*MB*	24698.924	$9634°_{1\frac{1}{2}} - 34333_{2\frac{1}{2}}$	12	4055.764	12	*MB*	24649.305	$6521°_{1\frac{1}{2}} - 31170_{1\frac{1}{2}}$	−7
4047.661	10	*MB*	24698.649	$16159°_{3\frac{1}{2}} - 40858_{4\frac{1}{2}}$	−19	4056.137	10	*MB*	24647.038	$9778°_{2\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−12
4047.714	10	*MB*	24698.325	$10114°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	7	4056.245	15	*MB*	24646.382	$16454_{2\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	5
4047.880	10	*MB*	24697.313	$7233°_{5\frac{1}{2}} - 31930_{4\frac{1}{2}}$	4	4056.334	15	*MB*	24645.841	$10274°_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	24
4048.038	3	*MB*	24696.349			4056.384	5	*MB*	24645.537		
4048.105	2	*MB*	24695.940			4056.670	2	*MB*	24643.800		
4048.336	7	*MB*	24694.531			4056.707	10	*MB*	24643.575	$4523°_{4\frac{1}{2}} - 29166_{4\frac{1}{2}}$	11
4048.367	20	*MB*	24694.342	$5942°_{3\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−16	4056.894	60	*MB*	24642.439	$8402°_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	12
4048.722	2	*MB*	24692.176	$14387_{4\frac{1}{2}} - 39079°_{5\frac{1}{2}}$	−9	4057.295	15	*MB*	24640.003	$13012°_{2\frac{1}{2}} - 37652_{2\frac{1}{2}}$	8
4048.936	2	*MB*	24690.872			4057.482	2	*MB*	24638.868		
4049.028	80	*MB*	24690.310	$6517°_{2\frac{1}{2}} - 31207_{3\frac{1}{2}}$	3	4057.741	4	*MB*	24637.295		
				$3995°_{3\frac{1}{2}} - 28685_{2\frac{1}{2}}$	13	4057.890	30	*MB*	24636.391		
4049.092	3	*MB*	24689.920			4058.248	60	*MB*	24634.217	$3703°_{3\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−2
4049.192	30	*MB*	24689.310	$7818°_{1\frac{1}{2}} - 32507_{1\frac{1}{2}}$	16	4058.751	35	*MB*	24631.164	$3703°_{3\frac{1}{2}} - 28334_{4\frac{1}{2}}$	3
4049.362	30	*MB*	24688.274	$5118°_{2\frac{1}{2}} - 29807_{3\frac{1}{2}}$	2	4058.928	3	*MB*	24630.090		
4049.536	10	*MB*	24687.213	$19950_{6\frac{1}{2}} - 44637°_{6\frac{1}{2}}$	5	4059.308	9	*MB*	24627.785	$5437°_{3\frac{1}{2}} - 30065_{3\frac{1}{2}}$	43
4049.582	10	*MB*	24686.933	$8175°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	29	4059.375	12	*MB*	24627.378	$4737°_{2\frac{1}{2}} - 29364_{3\frac{1}{2}}$	12
4049.790	20	*MB*	24685.665	$6389°_{4\frac{1}{2}} - 31075_{4\frac{1}{2}}$	4	4059.630	15	*MB*	24625.831	$27432°_{4\frac{1}{2}} - 52058_{4\frac{1}{2}}$	27
4049.904	2	*MB*	24684.970	$6549°_{2\frac{1}{2}} - 31234_{2\frac{1}{2}}$	0	4059.759	2	*MB*	24625.049		
4050.103	3	*MB*	24683.757			4059.881	2	*MB*	24624.309		
4050.316	5	*MB*	24682.459			4059.959	2	*MB*	24623.836		
4050.591	3	*MB*	24680.783			4060.033	1	*MB*	24623.387		
4050.726	4	*MB*	24679.961			4060.070	3	*MB*	24623.163		
4050.817	60	*MB*	24679.406	$7059°_{4\frac{1}{2}} - 31738_{5\frac{1}{2}}$	−5	4060.467	80	*MB*	24620.755	$6549°_{2\frac{1}{2}} - 31170_{1\frac{1}{2}}$	19
4050.949	8	*MB*	24678.602	$7259°_{3\frac{1}{2}} - 31937_{3\frac{1}{2}}$	25	4060.542	1	*MB*	24620.300		
4051.236	12	*MB*	24676.854	$8402°_{3\frac{1}{2}} - 33079_{3\frac{1}{2}}$	10	4060.831	6	*MB*	24618.548	$13515°_{3\frac{1}{2}} - 38134_{4\frac{1}{2}}$	2
4051.424	150	*MB*	24675.709	$5118°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−1	4061.413	20	*MB*	24615.021	$2634°_{2\frac{1}{2}} - 27249_{2\frac{1}{2}}$	18
4051.615	10	*MB*	24674.546	$9491°_{0\frac{1}{2}} - 34166_{1\frac{1}{2}}$	0	4061.701	12	*MB*	24613.275	$9198°_{3\frac{1}{2}} - 33811_{4\frac{1}{2}}$	34
4051.933	8	*MB*	24672.609	$15803_{4\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	−5	4062.218	200	*MB*	24610.143	$11015_{3\frac{1}{2}} - 35625°_{3\frac{1}{2}}$	22
4051.989	150	*MB*	24672.268	$5964°_{3\frac{1}{2}} - 30637_{2\frac{1}{2}}$	8	4062.556	15	*MB*	24608.095	$2641°_{3\frac{1}{2}} - 27249_{2\frac{1}{2}}$	−14

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4062.938	160	*MB*	24605.782	$2581°_{4\,1/2}-27187_{3\,1/2}$	−7
4063.044	10	*MB*	24605.140	$4844°_{1\,1/2}-29449_{1\,1/2}$	6
4063.328	15	*MB*	24603.420		
4063.781	4	*MB*	24600.678		
4063.920	80	*MB*	24599.836	$3745°_{1\,1/2}-28345_{0\,1/2}$	−4
4064.621	2	*MB*	24595.594		
4064.700	2	*MB*	24595.116		
4064.802	13	*MB*	24594.499	$5651°_{5\,1/2}-30245_{4\,1/2}$	−21
4064.904	60	*MB*	24593.881	$3703°_{3\,1/2}-28297_{3\,1/2}$	2
4065.161	60	*MB*	24592.327	$7259°_{3\,1/2}-31851_{2\,1/2}$	5
				$3745°_{1\,1/2}-28337_{2\,1/2}$	−11
4065.343	3	*MB*	24591.226	$9316_{3\,1/2}-33908°_{4\,1/2}$	−54
4066.057	12	*MB*	24586.907	$16133_{2\,1/2}-40720°_{1\,1/2}$	−20
4066.170	15	*MB*	24586.224	$8278_{5\,1/2}-32864°_{5\,1/2}$	0
4066.500	60	*MB*	24584.229	$12260°_{3\,1/2}-36844_{2\,1/2}$	12
				$10641°_{2\,1/2}-35225_{2\,1/2}$	15
4066.984	10	*MB*	24581.303		
4067.079	10	*MB*	24580.729		
4067.284	200	*MB*	24579.490	$8531_{3\,1/2}-33111°_{3\,1/2}$	6
4067.479	12	*MB*	24578.312		
4067.766	15	*MB*	24576.578	$14315°_{0\,1/2}-38892_{0\,1/2}$	9
4067.965	1	*MB*	24575.376		
4068.287	2	*MB*	24573.431		
4068.445	60	*MB*	24572.476	$7278°_{1\,1/2}-31851_{2\,1/2}$	2
4068.505	12	*MB*	24572.114	$9723°_{4\,1/2}-34295_{4\,1/2}$	0
4068.835	300	*MB*	24570.121	$5675°_{4\,1/2}-30245_{4\,1/2}$	6
4069.913	1	*MB*	24563.613	$7202°_{2\,1/2}-31766_{1\,1/2}$	33
4070.092	40	*MB*	24562.533	$20881_{6\,1/2}-45443°_{7\,1/2}$	8
4070.242	3	*MB*	24561.628		
4070.844	50	*MB*	24557.996	$12365°_{4\,1/2}-36923_{4\,1/2}$	13
4070.930	3	*MB*	24557.477		
4070.947	3	*MB*	24557.374		
4071.072	60	*MB*	24556.620	$5437°_{3\,1/2}-29994_{2\,1/2}$	2
4071.109	20	*MB*	24556.397	$10641°_{2\,1/2}-35197_{1\,1/2}$	0
4071.344	30	*MB*	24554.980	$5118°_{2\,1/2}-29673_{2\,1/2}$	16
4071.484	30	*MB*	24554.136	$9778°_{2\,1/2}-34333_{2\,1/2}$	24
4071.773	750	*MB*	24552.393	$2634°_{2\,1/2}-27187_{3\,1/2}$	12
4072.036	6	*MB*	24550.807		
4072.544	10	*MB*	24547.745	$10798°_{2\,1/2}-35346_{3\,1/2}$	18
4072.661	15	*MB*	24547.040	$8169°_{1\,1/2}-32716_{2\,1/2}$	91
4072.699	8	*MB*	24546.811		
4072.917	190	*MB*	24545.497	$2641°_{3\,1/2}-27187_{3\,1/2}$	9
4073.135	2	*MB*	24544.183		
4073.165	7	*MB*	24544.002	$4737°_{2\,1/2}-29281_{2\,1/2}$	1
4073.475	1300	*MB*	24542.134	$3854_{3\,1/2}-28396°_{2\,1/2}$	−3
4073.591	8	*MB*	24541.436		
4073.692	10	*MB*	24540.827	$8175°_{2\,1/2}-32716_{2\,1/2}$	43
4073.738	150	*MB*	24540.550	$9053_{3\,1/2}-33594°_{2\,1/2}$	27
				$8448_{2\,1/2}-32989°_{3\,1/2}$	−26
4074.123	15	*MB*	24538.231	$10274°_{3\,1/2}-34813_{2\,1/2}$	0
4074.165	6	*MB*	24537.978	$11387°_{3\,1/2}-35925_{3\,1/2}$	27
4074.646	20	*MB*	24535.082	$1410°_{4\,1/2}-25945_{3\,1/2}$	−9
4074.826	1	*MB*	24533.998		
4074.860	3	*MB*	24533.793		
4075.012	4	*MB*	24532.878		
4075.178	8	*MB*	24531.879	$9634°_{1\,1/2}-34166_{1\,1/2}$	26
4075.254	2	*MB*	24531.421		
4075.544	15	*MB*	24529.676	$5716°_{3\,1/2}-30245_{4\,1/2}$	14
4075.698	1100	*MB*	24528.749	$5651°_{5\,1/2}-30180_{6\,1/2}$	10
4075.844	1100	*MB*	24527.870	$4910°_{5\,1/2}-29438_{5\,1/2}$	16
4076.141	15	*MB*	24526.083		
4076.237	150	*MB*	24525.505	$6517°_{2\,1/2}-31043_{2\,1/2}$	15
4076.347	3	*MB*	24524.844		
4076.538	4	*MB*	24523.694		
4076.689	4	*MB*	24522.786		
4076.856	15	*MB*	24521.782	$6521°_{1\,1/2}-31043_{2\,1/2}$	4
4076.955	2	*MB*	24521.186		
4077.073	2	*MB*	24520.477		
4077.464	300	*MB*	24518.125	$4511°_{2\,1/2}-29029_{1\,1/2}$	29
				$2382°_{4\,1/2}-26900_{3\,1/2}$	17
4077.710	5	*MB*	24516.646		
4077.932	2	*MB*	24515.311	$9491°_{0\,1/2}-34006_{0\,1/2}$	−17
4078.156	2	*MB*	24513.965		
4078.227	3	*MB*	24513.538		
4078.317	380	*MB*	24512.997	$7722_{2\,1/2}-32235°_{3\,1/2}$	43
4078.510	190	*MB*	24511.837	$7454_{1\,1/2}-31966°_{2\,1/2}$	41
4078.601	60	*MB*	24511.290	$13758°_{1\,1/2}-38269_{0\,1/2}$	−13
				$6521°_{1\,1/2}-31032_{0\,1/2}$	12
4078.988	30	*MB*	24508.965	$7059°_{4\,1/2}-31568_{4\,1/2}$	18
4079.034	30	*MB*	24508.689	$8531_{3\,1/2}-33040°_{4\,1/2}$	14
4079.165	4	*MB*	24507.901		
4079.273	6	*MB*	24507.253	$5283°_{0\,1/2}-29790_{0\,1/2}$	12
4079.674	100	*MB*	24504.844	$7233°_{5\,1/2}-31738_{5\,1/2}$	−12
4079.878	2	*MB*	24503.618		
4080.227	6	*MB*	24501.523		
4080.287	30	*MB*	24501.162	$5924°_{1\,1/2}-30425_{2\,1/2}$	18
4080.355	10	*MB*	24500.754	$0°_{3\,1/2}-24500_{2\,1/2}$	−1
4080.436	190	*MB*	24500.268	$2879°_{5\,1/2}-27379_{5\,1/2}$	14
4080.553	50	*MB*	24499.565	$7059°_{4\,1/2}-31558_{3\,1/2}$	12
4080.735	10	*MB*	24498.473		
4081.219	480	*MB*	24495.567	$3854_{3\,1/2}-28349°_{3\,1/2}$	−2
4081.608	30	*MB*	24493.233	$6549°_{2\,1/2}-31043_{2\,1/2}$	31
4082.097	12	*MB*	24490.299	$5675°_{4\,1/2}-30166_{3\,1/2}$	5
4082.214	2	*MB*	24489.597		
4082.346	2	*MB*	24488.805		
4082.381	8	*MB*	24488.595		
4082.952	15	*MB*	24485.171	$13784°_{1\,1/2}-38269_{0\,1/2}$	31
4083.219	650	*MB*	24483.569	$5651°_{5\,1/2}-30134_{5\,1/2}$	17
4083.388	4	*MB*	24482.556	$5942°_{3\,1/2}-30425_{2\,1/2}$	5
4083.479	80	*MB*	24482.011	$9053_{3\,1/2}-33535°_{3\,1/2}$	4

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4083.628	80	*MB*	24481.117	$16192°_{4\frac{1}{2}}-40673_{5\frac{1}{2}}$	8	4092.773	6	*MB*	24426.417		
4083.785	2	*MB*	24480.176	$10454°_{1\frac{1}{2}}-34934_{2\frac{1}{2}}$	25	4092.825	1	*MB*	24426.107	$18147°_{2\frac{1}{2}}-42573_{3\frac{1}{2}}$	−78
4083.910	4	*MB*	24479.427			4093.088	2	*MB*	24424.537		
4084.065	5	*MB*	24478.498			4093.120	2	*MB*	24424.346		
4084.092	5	*MB*	24478.336	$13659°_{4\frac{1}{2}}-38137_{5\frac{1}{2}}$	−16	4093.876	6	*MB*	24419.836	$11387°_{3\frac{1}{2}}-35807_{4\frac{1}{2}}$	0
4084.187	10	*MB*	24477.767	$10035°_{5\frac{1}{2}}-34513_{6\frac{1}{2}}$	10	4093.956	110	*MB*	24419.359	$4266°_{3\frac{1}{2}}-28685_{2\frac{1}{2}}$	−1
4084.475	2	*MB*	24476.041			4094.075	4	*MB*	24418.649		
4084.636	20	*MB*	24475.076	$13659°_{4\frac{1}{2}}-38134_{4\frac{1}{2}}$	5	4094.460	5	*MB*	24416.353		
4085.234	320	*MB*	24471.493	$5437°_{3\frac{1}{2}}-29908_{4\frac{1}{2}}$	12	4094.659	8	*MB*	24415.167		
4085.426	5	*MB*	24470.343			4094.808	2	*MB*	24414.278		
4085.672	4	*MB*	24468.870			4095.253	8	*MB*	24411.625	$6549°_{2\frac{1}{2}}-30961_{1\frac{1}{2}}$	16
4085.740	15	*MB*	24468.463	$8169°_{1\frac{1}{2}}-32638_{1\frac{1}{2}}$	−3	4095.369	2	*MB*	24410.934		
4086.430	60	*MB*	24464.331	$4266°_{3\frac{1}{2}}-28730_{3\frac{1}{2}}$	16	4095.732	2	*MB*	24408.771		
4086.768	15	*MB*	24462.308	$8175°_{2\frac{1}{2}}-32638_{1\frac{1}{2}}$	6	4095.807	15	*MB*	24408.323	$7522°_{5\frac{1}{2}}-31930_{4\frac{1}{2}}$	9
4087.078	3	*MB*	24460.453	$5964°_{3\frac{1}{2}}-30425_{2\frac{1}{2}}$	0	4095.858	6	*MB*	24408.020	$4322°_{2\frac{1}{2}}-28730_{3\frac{1}{2}}$	16
4087.102	15	*MB*	24460.309	$11742°_{5\frac{1}{2}}-36202_{4\frac{1}{2}}$	−2	4096.263	5	*MB*	24405.606		
4087.171	5	*MB*	24459.896			4096.453	4	*MB*	24404.474		
4087.295	60	*MB*	24459.154	$2382°_{4\frac{1}{2}}-26841_{4\frac{1}{2}}$	16	4096.605	8	*MB*	24403.569		
				$5675°_{4\frac{1}{2}}-30134_{5\frac{1}{2}}$	7	4096.832	6	*MB*	24402.217		
4087.360	180	*MB*	24458.765	$4266°_{3\frac{1}{2}}-28725_{4\frac{1}{2}}$	14	4096.962	2	*MB*	24401.443		
4087.562	50	*MB*	24457.556	$8531_{3\frac{1}{2}}-32989°_{3\frac{1}{2}}$	17	4097.326	10	*MB*	24399.275	$10798°_{2\frac{1}{2}}-35197_{1\frac{1}{2}}$	−9
4087.770	3	*MB*	24456.312			4097.546	8	*MB*	24397.965		
4087.826	2	*MB*	24455.977	$14481°_{2\frac{1}{2}}-38937_{1\frac{1}{2}}$	95	4097.800	4	*MB*	24396.453	$24153_{3\frac{1}{2}}-48549°_{4\frac{1}{2}}$	−70
4087.997	5	*MB*	24454.954			4098.065	3	*MB*	24394.875		
4088.192	5	*MB*	24453.787	$14625_{5\frac{1}{2}}-39079°_{5\frac{1}{2}}$	−7	4098.280	9	*MB*	24393.595		
4088.321	8	*MB*	24453.016			4098.458	12	*MB*	24392.536	$7746°_{2\frac{1}{2}}-32138_{2\frac{1}{2}}$	23
4088.581	30	*MB*	24451.461	$16268_{1\frac{1}{2}}-40720°_{1\frac{1}{2}}$	12	4098.614	3	*MB*	24391.607		
				$6638°_{4\frac{1}{2}}-31089_{5\frac{1}{2}}$	−11	4098.981	60	*MB*	24389.423	$5675°_{4\frac{1}{2}}-30065_{3\frac{1}{2}}$	23
4088.849	160	*MB*	24449.858	$5716°_{3\frac{1}{2}}-30166_{3\frac{1}{2}}$	18	4099.250	5	*MB*	24387.823		
4088.996	50	*MB*	24448.979	$3363°_{2\frac{1}{2}}-27812_{2\frac{1}{2}}$	9	4099.378	6	*MB*	24387.062	$9778°_{2\frac{1}{2}}-34166_{1\frac{1}{2}}$	9
4089.054	6	*MB*	24448.633	$24819_{3\frac{1}{2}}-49267°_{4\frac{1}{2}}$	−14	4099.573	5	*MB*	24385.902		
4089.147	30	*MB*	24448.077	$3363°_{2\frac{1}{2}}-27811_{3\frac{1}{2}}$	8	4099.593	2	*MB*	24385.783		
4089.290	8	*MB*	24447.222			4099.741	30	*MB*	24384.903	$9491°_{0\frac{1}{2}}-33876_{1\frac{1}{2}}$	19
4089.736	50	*MB*	24444.556	$7293°_{6\frac{1}{2}}-31738_{5\frac{1}{2}}$	10	4100.022	2	*MB*	24383.231		
4089.844	50	*MB*	24443.910	$6517°_{2\frac{1}{2}}-30961_{1\frac{1}{2}}$	11	4100.423	10	*MB*	24380.847	$10646_{5\frac{1}{2}}-35026°_{4\frac{1}{2}}$	−26
4090.001	10	*MB*	24442.972			4100.489	15	*MB*	24380.454		
4090.465	90	*MB*	24440.199	$6521°_{1\frac{1}{2}}-30961_{1\frac{1}{2}}$	14	4100.642	3	*MB*	24379.545		
4090.523	15	*MB*	24439.853	$7878°_{3\frac{1}{2}}-32318_{3\frac{1}{2}}$	6	4101.110	12	*MB*	24376.763		
4090.685	2	*MB*	24438.885	$5010°_{2\frac{1}{2}}-29449_{1\frac{1}{2}}$	−22	4101.180	5	*MB*	24376.347	$9778°_{2\frac{1}{2}}-34155_{3\frac{1}{2}}$	22
4090.852	15	*MB*	24437.887			4101.450	2	*MB*	24374.742		
4090.941	90	*MB*	24437.356	$6638°_{4\frac{1}{2}}-31075_{4\frac{1}{2}}$	11	4101.563	10	*MB*	24374.070	$987°_{4\frac{1}{2}}-25361_{4\frac{1}{2}}$	8
4091.044	20	*MB*	24436.740	$8448_{2\frac{1}{2}}-32885°_{2\frac{1}{2}}$	15	4101.769	320	*MB*	24372.846	$6967_{6\frac{1}{2}}-31340°_{6\frac{1}{2}}$	1
				$4844°_{1\frac{1}{2}}-29281_{2\frac{1}{2}}$	11	4102.237	12	*MB*	24370.066		
4091.219	7	*MB*	24435.695	$8280°_{2\frac{1}{2}}-32716_{2\frac{1}{2}}$	−5	4102.366	50	*MB*	24369.300	$8927°_{5\frac{1}{2}}-33296_{4\frac{1}{2}}$	9
4091.426	1	*MB*	24434.459			4102.616	8	*MB*	24367.815		
4091.587	8	*MB*	24433.497	$12762°_{4\frac{1}{2}}-37196_{4\frac{1}{2}}$	0	4102.697	5	*MB*	24367.333		
4091.837	10	*MB*	24432.005	$9723°_{4\frac{1}{2}}-34155_{3\frac{1}{2}}$	29	4102.839	3	*MB*	24366.490		
4092.080	35	*MB*	24430.554	$4203°_{6\frac{1}{2}}-28634_{5\frac{1}{2}}$	−27	4103.070	1	*MB*	24365.118		
4092.613	3	*MB*	24427.372			4103.415	5	*MB*	24363.070	$4322°_{2\frac{1}{2}}-28685_{2\frac{1}{2}}$	20
4092.715	70	*MB*	24426.763	$5819°_{4\frac{1}{2}}-30245_{4\frac{1}{2}}$	−1	4103.626	15	*MB*	24361.817		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4104.112	15	MB	24358.932	$10454°_{1\frac{1}{2}} - 34813_{2\frac{1}{2}}$	3	4115.370	300	MB	24292.297	$7454_{1\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	6
4104.425	35	MB	24357.075	$5437°_{3\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−19	4115.484	1	MB	24291.624		
4104.590	2	MB	24356.096	$7202°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	0	4116.162	1	MB	24287.623		
4104.677	1	MB	24355.579			4116.226	1	MB	24287.246		
4104.911	2	MB	24354.191	$9198°_{3\frac{1}{2}} - 33552_{2\frac{1}{2}}$	−64	4117.008	180	MB	24282.633	$11015_{3\frac{1}{2}} - 35298°_{2\frac{1}{2}}$	22
4104.962	10	MB	24353.889	$5010°_{2\frac{1}{2}} - 29364_{3\frac{1}{2}}$	19	4117.288	140	MB	24280.981	$5964°_{3\frac{1}{2}} - 30245_{4\frac{1}{2}}$	0
4104.995	180	MB	24353.693	$8531_{3\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	4	4117.583	140	MB	24279.242	$6549°_{2\frac{1}{2}} - 30829_{3\frac{1}{2}}$	26
4105.487	1	MB	24350.774	$14481°_{2\frac{1}{2}} - 38832_{2\frac{1}{2}}$	−4	4117.821	5	MB	24277.839	$5716°_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	14
4105.525	1	MB	24350.549			4117.985	10	MB	24276.872	$5969°_{5\frac{1}{2}} - 30245_{4\frac{1}{2}}$	1
4105.792	1	MB	24348.965	$5716°_{3\frac{1}{2}} - 30065_{3\frac{1}{2}}$	18	4118.141	550	MB	24275.952	$5616_{4\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	14
4105.972	1	MB	24347.898	$8702°_{1\frac{1}{2}} - 33050_{1\frac{1}{2}}$	51	4118.251	3	MB	24275.304	$8804°_{4\frac{1}{2}} - 33079_{3\frac{1}{2}}$	16
4106.046	1	MB	24347.459			4118.635	2	MB	24273.040	$15565°_{2\frac{1}{2}} - 39838_{2\frac{1}{2}}$	16
4106.131	50	MB	24346.955	$5819°_{4\frac{1}{2}} - 30166_{3\frac{1}{2}}$	12	4119.007	180	MB	24270.848	$4459°_{3\frac{1}{2}} - 28730_{3\frac{1}{2}}$	8
4106.213	4	MB	24346.469			4119.064	2	MB	24270.513	$5010°_{2\frac{1}{2}} - 29281_{2\frac{1}{2}}$	9
4106.572	1	MB	24344.341			4119.780	220	MB	24266.295	$8774_{4\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	6
4106.841	50	MB	24342.746	$16133_{2\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	15	4119.881	220	MB	24265.700	$2634°_{2\frac{1}{2}} - 26900_{3\frac{1}{2}}$	12
4106.905	40	MB	24342.367	$3995°_{3\frac{1}{2}} - 28337_{2\frac{1}{2}}$	13	4119.954	6	MB	24265.270	$4459°_{3\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−5
4107.175	2	MB	24340.767	$3593°_{4\frac{1}{2}} - 27934_{4\frac{1}{2}}$	11	4120.542	2	MB	24261.807		
4107.421	360	MB	24339.309	$3995°_{3\frac{1}{2}} - 28334_{4\frac{1}{2}}$	13	4120.639	1	MB	24261.236		
4107.741	4	MB	24337.413	$10088°_{1\frac{1}{2}} - 34426_{2\frac{1}{2}}$	16	4120.783	5	MB	24260.388	$7878°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	18
4107.799	35	MB	24337.069	$8774_{4\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	−29	4120.828	320	MB	24260.123	$2581°_{4\frac{1}{2}} - 26841_{4\frac{1}{2}}$	−3
4108.249	18	MB	24334.403	$7233°_{5\frac{1}{2}} - 31568_{4\frac{1}{2}}$	12	4120.894	2	MB	24259.735	$10035°_{5\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−3
4108.479	2	MB	24333.041	$7011_{4\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	17	4121.055	2	MB	24258.787	$2641°_{3\frac{1}{2}} - 26900_{3\frac{1}{2}}$	−7
4108.539	2	MB	24332.686	$13515°_{3\frac{1}{2}} - 37848_{2\frac{1}{2}}$	−10	4121.266	4	MB	24257.545	$5651°_{5\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−1
4108.722	8	MB	24331.602	$8175°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	23	4121.529	1	MB	24255.997	$25361_{4\frac{1}{2}} - 49617°_{5\frac{1}{2}}$	−28
4108.826	1	MB	24330.986	$5118°_{2\frac{1}{2}} - 29449_{1\frac{1}{2}}$	15	4121.589	10	MB	24255.644	$4910°_{5\frac{1}{2}} - 29166_{4\frac{1}{2}}$	10
4108.954	1	MB	24330.228	$13012°_{2\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−3	4121.681	2	MB	24255.103		
4109.246	1	MB	24328.500			4121.783	2	MB	24254.502		
4109.433	2	MB	24327.392			4121.900	4	MB	24253.814	$9723°_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	9
4109.541	30	MB	24326.753	$3508°_{0\frac{1}{2}} - 27835_{1\frac{1}{2}}$	−9	4121.975	1	MB	24253.373	$11949°_{3\frac{1}{2}} - 36202_{4\frac{1}{2}}$	5
4109.664	2	MB	24326.025			4122.144	1	MB	24252.378		
4110.026	4	MB	24323.882	$3793°_{6\frac{1}{2}} - 28117_{7\frac{1}{2}}$	−2	4122.642	2	MB	24249.449		
4110.376	140	MB	24321.811	$8789_{2\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	29	4122.872	1	MB	24248.096	$7092_{5\frac{1}{2}} - 31340°_{6\frac{1}{2}}$	−31
4110.490	2	MB	24321.137	$9723°_{4\frac{1}{2}} - 34044_{4\frac{1}{2}}$	31	4122.965	1	MB	24247.549		
4110.589	3	MB	24320.551	$7818°_{1\frac{1}{2}} - 32138_{2\frac{1}{2}}$	0	4123.029	10	MB	24247.173		
4110.837	50	MB	24319.084	$2581°_{4\frac{1}{2}} - 26900_{3\frac{1}{2}}$	−12	4123.234	360	MB	24245.967	$5118°_{2\frac{1}{2}} - 29364_{3\frac{1}{2}}$	33
4111.390	180	MB	24315.813	$5819°_{4\frac{1}{2}} - 30134_{5\frac{1}{2}}$	16	4123.489	360	MB	24244.468	$7722_{2\frac{1}{2}} - 31966°_{2\frac{1}{2}}$	5
4111.624	1	MB	24314.429	$13659°_{4\frac{1}{2}} - 37973_{3\frac{1}{2}}$	−17					$10088°_{1\frac{1}{2}} - 34333_{2\frac{1}{2}}$	10
4111.687	1	MB	24314.056	$8402°_{3\frac{1}{2}} - 32716_{2\frac{1}{2}}$	78	4123.873	700	MB	24242.210	$6913°_{6\frac{1}{2}} - 31155_{6\frac{1}{2}}$	−20
4111.922	25	MB	24312.667	$6389°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	0	4124.342	4	MB	24239.454		
4112.240	1	MB	24310.787			4124.784	360	MB	24236.856	$5513_{5\frac{1}{2}} - 29750°_{5\frac{1}{2}}$	18
4112.807	1	MB	24307.435			4124.996	2	MB	24235.611		
4113.332	2	MB	24304.333	$9269°_{0\frac{1}{2}} - 33574_{1\frac{1}{2}}$	15	4125.047	2	MB	24235.311		
4113.544	9	MB	24303.080	$5942°_{3\frac{1}{2}} - 30245_{4\frac{1}{2}}$	1	4125.188	1	MB	24234.483		
4113.722	70	MB	24302.029	$3995°_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	16	4125.387	7	MB	24233.313		
4114.139	35	MB	24299.566	$7259°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	15	4125.422	20	MB	24233.108	$5675°_{4\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−32
4114.193	2	MB	24299.247			4125.451	7	MB	24232.938	$11325°_{2\frac{1}{2}} - 35558_{3\frac{1}{2}}$	17
4114.490	1	MB	24297.493			4125.644	5	MB	24231.804		
4114.527	1	MB	24297.275			4125.778	35	MB	24231.017	$3703°_{3\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−26
4114.719	1	MB	24296.141	$26268°_{3\frac{1}{2}} - 50564_{2\frac{1}{2}}$	40	4126.487	2	MB	24226.854		

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4126.522	5	*MB*	24226.649			4137.649	1400	*MB*	24161.499	$4165_{4\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	−21
4126.553	4	*MB*	24226.466	$8280°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−29	4138.101	190	*MB*	24158.860	$7454_{1\frac{1}{2}} - 31613°_{0\frac{1}{2}}$	−21
4126.656	40	*MB*	24225.862	$4459°_{3\frac{1}{2}} - 28685_{2\frac{1}{2}}$	−23	4138.269	8	*MB*	24157.879	$8702°_{1\frac{1}{2}} - 32860_{0\frac{1}{2}}$	−29
4126.762	6	*MB*	24225.239			4138.358	150	*MB*	24157.360	$10869_{4\frac{1}{2}} - 35026°_{4\frac{1}{2}}$	−42
4126.881	50	*MB*	24224.541	$7713°_{4\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−22	4139.027	4	*MB*	24153.455	$0°_{3\frac{1}{2}} - 24153_{3\frac{1}{2}}$	−10
4126.987	40	*MB*	24223.919	$6521°_{1\frac{1}{2}} - 30745_{1\frac{1}{2}}$	−34	4139.437	40	*MB*	24151.063	$10274°_{3\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−2
4127.105	40	*MB*	24223.226	$5942°_{3\frac{1}{2}} - 30166_{3\frac{1}{2}}$	−32	4139.820	6	*MB*	24148.829	$7059°_{4\frac{1}{2}} - 31207_{3\frac{1}{2}}$	−25
4127.371	700	*MB*	24221.665	$5513_{5\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	−38	4139.871	1	*MB*	24148.531		
4127.592	20	*MB*	24220.368	$13012°_{2\frac{1}{2}} - 37232_{1\frac{1}{2}}$	26	4140.517	5	*MB*	24144.764	$8169°_{1\frac{1}{2}} - 32314_{0\frac{1}{2}}$	−6
4127.750	180	*MB*	24219.441	$4511°_{2\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−13	4140.750	40	*MB*	24143.405	$4201°_{1\frac{1}{2}} - 28345_{0\frac{1}{2}}$	−17
4127.876	5	*MB*	24218.702	$9316_{3\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	−21	4140.935	10	*MB*	24142.326	$8175°_{2\frac{1}{2}} - 32318_{3\frac{1}{2}}$	15
4127.963	20	*MB*	24218.191	$10114°_{2\frac{1}{2}} - 34333_{2\frac{1}{2}}$	−23	4141.378	2	*WA*	24139.744	$7011_{4\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	14
4128.060	140	*MB*	24217.622	$3593°_{4\frac{1}{2}} - 27811_{3\frac{1}{2}}$	9	4141.547	1	*MB*	24138.759		
4128.358	130	*MB*	24215.874	$7522°_{5\frac{1}{2}} - 31738_{5\frac{1}{2}}$	12	4141.682	2	*MB*	24137.972		
4128.483	30	*MB*	24215.141	$8774_{4\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	−12	4141.839	1	*MB*	24137.057		
4128.606	10	*MB*	24214.420			4141.886	1	*MB*	24136.783	$14315°_{0\frac{1}{2}} - 38452_{1\frac{1}{2}}$	−34
4129.093	40	*MB*	24211.564	$9198°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−6	4142.039	5	*MB*	24135.892	$10798°_{2\frac{1}{2}} - 34934_{2\frac{1}{2}}$	24
4129.176	60	*MB*	24211.077	$5969°_{5\frac{1}{2}} - 30180_{6\frac{1}{2}}$	−11					$4201°_{1\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−28
4129.430	12	*MB*	24209.588			4142.397	550	*MB*	24133.806	$5616_{4\frac{1}{2}} - 29750°_{5\frac{1}{2}}$	−1
4129.764	8	*MB*	24207.630	$4523°_{4\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−48	4142.824	110	*MB*	24131.319	$5675°_{4\frac{1}{2}} - 29807_{3\frac{1}{2}}$	4
4129.773	10	*MB*	24207.577			4143.276	2	*MB*	24128.686		
4130.251	5	*MB*	24204.776			4143.457	1	*MB*	24127.632		
4130.375	5	*MB*	24204.049			4144.146	2	*MB*	24123.621		
4130.709	380	*MB*	24202.092	$4523°_{4\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−22	4144.365	10	*MB*	24122.346	$5942°_{3\frac{1}{2}} - 30065_{3\frac{1}{2}}$	−19
4130.983	5	*MB*	24200.487			4144.494	280	*MB*	24121.595	$3854_{3\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	−11
4131.100	340	*MB*	24199.802	$2641°_{3\frac{1}{2}} - 26841_{4\frac{1}{2}}$	−22	4144.849	10	*MB*	24119.529	$6517°_{2\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−8
4131.533	3	*MB*	24197.265			4144.996	480	*MB*	24118.674	$5616_{4\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	0
4131.858	20	*MB*	24195.362	$6549°_{2\frac{1}{2}} - 30745_{1\frac{1}{2}}$	−15	4145.095	5	*MB*	24118.098		
4131.993	5	*MB*	24194.572			4145.349	1	*MB*	24116.620		
4132.155	1	*MB*	24193.623			4145.385	3	*MB*	24116.410		
4132.317	70	*MB*	24192.674	$5716°_{3\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−13	4145.488	5	*MB*	24115.811	$6521°_{1\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−13
4132.524	4	*MB*	24191.463	$7746°_{2\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−4	4145.858	3	*MB*			
4132.627	40	*MB*	24190.860	$6638°_{4\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−5	4146.234	340	*MB*	24111.472	$4523°_{4\frac{1}{2}} - 28634_{5\frac{1}{2}}$	−10
4132.915	8	*MB*	24189.174			4146.487	6	*MB*	24110.001	$7259°_{3\frac{1}{2}} - 31369_{2\frac{1}{2}}$	−16
4132.951	10	*MB*	24188.963			4146.698	6	*MB*	24108.775	$7061°_{0\frac{1}{2}} - 31170_{1\frac{1}{2}}$	−31
										$3703°_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−28
4133.048	12	*MB*	24188.396	$11949°_{3\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−18						
4133.483	2	*MB*	24185.850			4147.310	1	*MB*	24105.217	$7746°_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	5
4133.686	10	*MB*	24184.663	$4844°_{1\frac{1}{2}} - 29029_{1\frac{1}{2}}$	−45	4147.510	1	*MB*	24104.055	$8131_{4\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	33
4133.802	1900	*MB*	24183.984	$6967_{6\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	−2	4147.597	1	*MB*	24103.549		
4134.550	2	*MB*	24179.609			4147.806	1	*MB*	24102.335		
4134.661	10	*MB*	24178.960	$20714_{2\frac{1}{2}} - 44893°_{3\frac{1}{2}}$	−19	4148.057	1	*MB*	24100.876	$17000_{3\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	−48
4135.424	190	*MB*	24174.499	$4511°_{2\frac{1}{2}} - 28685_{2\frac{1}{2}}$	−1	4148.165	60	*MB*	24100.249	$5964°_{3\frac{1}{2}} - 30065_{3\frac{1}{2}}$	−18
4135.894	40	*MB*	24171.752	$10641°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−7	4148.464	1	*MB*	24098.512	$9198°_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	33
4136.751	30	*MB*	24166.744	$5283°_{0\frac{1}{2}} - 29449_{1\frac{1}{2}}$	−4	4148.661	1	*MB*	24097.367	$9778°_{2\frac{1}{2}} - 33876_{1\frac{1}{2}}$	−23
4136.789	40	*MB*	24166.522	$7202°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	−41	4148.900	200	*MB*	24095.979	$8789_{2\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	−7
						4149.146	8	*MB*	24094.551	$8278_{5\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	−15
4136.895	60	*MB*	24165.903	$5969°_{5\frac{1}{2}} - 30134_{5\frac{1}{2}}$	0	4149.782	300	*MB*	24090.858	$5716°_{3\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−3
4137.256	4	*MB*	24163.794			4149.895	400	*MB*	24090.202	$8774_{4\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	−11
4137.425	10	*MB*	24162.807	$23267_{3\frac{1}{2}} - 47430°_{3\frac{1}{2}}$	−25					$7278°_{1\frac{1}{2}} - 31369_{2\frac{1}{2}}$	31
				$11949°_{3\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−24	4149.971	300	*MB*	24089.761	$5819°_{4\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−29
4137.481	190	*MB*	24162.480	$5118°_{2\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−87					$3745°_{1\frac{1}{2}} - 27835_{1\frac{1}{2}}$	3

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4150.234	3	MB	24088.234	$9723°_{4\frac{1}{2}} - 33811_{4\frac{1}{2}}$	2
4150.408	4	MB	24087.224	$6549°_{2\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−24
4150.756	2	MB	24085.205		
4150.908	300	MB	24084.323	$8531_{3\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	−17
4151.149	1	MB	24082.925	$20554_{5\frac{1}{2}} - 44637°_{6\frac{1}{2}}$	−26
4151.196	1	MB	24082.652	$9491°_{0\frac{1}{2}} - 33574_{1\frac{1}{2}}$	1
4151.969	1000	MB	24078.169	$5513_{5\frac{1}{2}} - 29591°_{6\frac{1}{2}}$	5
4152.080	2	MB	24077.525		
4152.220	1	MB	24076.713		
4152.636	2	MB	24074.301		
4152.927	40	MB	24072.614	$13515°_{3\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−5
4153.130	160	MB	24071.438	$4266°_{3\frac{1}{2}} - 28337_{2\frac{1}{2}}$	21
				$1873°_{3\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−23
4153.376	3	MB	24070.012		
4153.407	4	MB	24069.832	$5924°_{1\frac{1}{2}} - 29994_{2\frac{1}{2}}$	−4
4153.662	1	MB	24068.355	$4266°_{3\frac{1}{2}} - 28334_{4\frac{1}{2}}$	−3
4153.872	2	MB	24067.138		
4153.924	35	MB	24066.837	$13012°_{2\frac{1}{2}} - 37078_{1\frac{1}{2}}$	53
4154.357	1	MB	24064.328	$6638°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	−23
4154.463	2	MB	24063.714	$13784°_{1\frac{1}{2}} - 37848_{2\frac{1}{2}}$	−1
4154.654	1	MB	24062.608		
4155.133	2	MB	24059.834	$5924°_{1\frac{1}{2}} - 29984_{1\frac{1}{2}}$	−13
4155.222	60	MB	24059.319	$7878°_{3\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−5
4155.269	30	MB	24059.047		
4155.358	5	MB	24058.532	$8804°_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−10
4155.425	5	MB	24058.144	$10274°_{3\frac{1}{2}} - 34333_{2\frac{1}{2}}$	17
4155.532	130	MB	24057.524	$9053_{3\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	−9
4155.650	1	MB	24056.841		
4155.983	4	MB	24054.914	$12057°_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	0
4156.085	2	MB	24054.323		
4156.631	3	MB	24051.164	$10114°_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	8
4156.744	2	MB	24050.510		
4156.771	3	MB	24050.354	$12466°_{1\frac{1}{2}} - 36516_{1\frac{1}{2}}$	−13
4157.108	3	MB	24048.404		
4157.340	3	MB	24047.062	$14481°_{2\frac{1}{2}} - 38529_{2\frac{1}{2}}$	−28
4157.556	7	MB	24045.813	$13758°_{1\frac{1}{2}} - 37804_{1\frac{1}{2}}$	49
4157.624	4	MB	24045.419	$7522°_{5\frac{1}{2}} - 31568_{4\frac{1}{2}}$	22
4158.715	1	MB	24039.112		
4159.028	320	MB	24037.302	$8789_{2\frac{1}{2}} - 32826°_{1\frac{1}{2}}$	14
4159.621	2	MB	24033.876		
4159.728	4	MB	24033.258	$7818°_{1\frac{1}{2}} - 31851_{2\frac{1}{2}}$	8
4159.885	3	MB	24032.350	$7202°_{2\frac{1}{2}} - 31234_{2\frac{1}{2}}$	0
4159.983	3	MB	24031.784	$19136°_{2\frac{1}{2}} - 43167_{1\frac{1}{2}}$	−71
4160.107	50	MB	24031.068	$4266°_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−7
4160.176	50	MB	24030.669	$7059°_{4\frac{1}{2}} - 31089_{5\frac{1}{2}}$	11
4160.404	3	MB	24029.352	$19138°_{1\frac{1}{2}} - 43167_{1\frac{1}{2}}$	7
				$9778°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	22
4160.437	2	MB	24029.162	$5964°_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	17
4161.164	80	MB	24024.964	$7722_{2\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	6
4161.785	6	MB	24021.379	$16454_{2\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	9
4161.938	6	MB	24020.496	$10274°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	17
				$11325°_{2\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−4
4162.031	1	MB	24019.959	$7746°_{2\frac{1}{2}} - 31766_{1\frac{1}{2}}$	35
4162.254	3	MB	24018.672		
4162.287	10	MB	24018.482	$5010°_{2\frac{1}{2}} - 29029_{1\frac{1}{2}}$	0
4162.625	110	MB	24016.532	$7059°_{4\frac{1}{2}} - 31075_{4\frac{1}{2}}$	1
4162.873	6	MB	24015.101	$4322°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−4
4162.963	2	MB	24014.582	$10798°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−64
4163.027	1	MB	24014.213	$8702°_{1\frac{1}{2}} - 32716_{2\frac{1}{2}}$	10
4163.124	3	MB	24013.653		
4163.520	220	MB	24011.369	$11015_{3\frac{1}{2}} - 35026°_{4\frac{1}{2}}$	4
4163.979	9	MB	24008.722	$10035°_{5\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−7
4164.090	2	MB	24008.082	$14827_{3\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	−28
4164.763	1	MB	24004.203		
4164.790	2	MB	24004.047	$10924°_{4\frac{1}{2}} - 34928_{4\frac{1}{2}}$	−45
4165.380	1	MB	24000.647		
4165.600	900	MB	23999.380	$7341_{5\frac{1}{2}} - 31340°_{6\frac{1}{2}}$	−5
4165.850	10	MB	23997.940	$8804°_{4\frac{1}{2}} - 32802_{5\frac{1}{2}}$	0
4166.196	40	MB	23995.947	$10924°_{4\frac{1}{2}} - 34920_{3\frac{1}{2}}$	35
4166.360	2	MB	23995.002		
4166.410	1	MB	23994.714		
4166.462	3	MB	23994.415		
4166.647	110	MB	23993.349	$4737°_{2\frac{1}{2}} - 28730_{3\frac{1}{2}}$	11
4166.881	440	MB	23992.002	$10869_{4\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	17
4167.580	6	MB	23987.978	$5819°_{4\frac{1}{2}} - 29807_{3\frac{1}{2}}$	13
4167.797	180	MB	23986.729	$9053_{3\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	5
4168.660	2	MB	23981.763		
4168.969	3	MB	23979.986		
4169.007	2	MB	23979.767		
4169.694	5	MB	23975.817	$7259°_{3\frac{1}{2}} - 31234_{2\frac{1}{2}}$	13
4169.765	230	MB	23975.408	$5819°_{4\frac{1}{2}} - 29794_{3\frac{1}{2}}$	4
4169.876	230	MB	23974.770	$4322°_{2\frac{1}{2}} - 28297_{3\frac{1}{2}}$	5
4170.019	2	MB	23973.948		
4170.170	3	MB	23973.080	$7878°_{3\frac{1}{2}} - 31851_{2\frac{1}{2}}$	11
4170.384	1	MB	23971.850	$10454°_{1\frac{1}{2}} - 34426_{2\frac{1}{2}}$	85
4170.735	2	MB	23969.832		
4170.853	2	MB	23969.154	$10798°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	19
4171.033	9	MB	23968.120	$7202°_{2\frac{1}{2}} - 31170_{1\frac{1}{2}}$	4
4171.151	1	MB	23967.442		
4171.381	40	MB	23966.120	$5942°_{3\frac{1}{2}} - 29908_{4\frac{1}{2}}$	15
4171.726	1	MB	23964.138		
4171.950	4	MB	23962.852	$8175°_{2\frac{1}{2}} - 32138_{2\frac{1}{2}}$	17
4172.152	80	MB	23961.692	$2879°_{5\frac{1}{2}} - 26841_{4\frac{1}{2}}$	3
4172.486	5	MB	23959.773		
4172.700	2	MB	23958.545	$11387°_{3\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−5
4172.885	4	WA	23957.482	$5716°_{3\frac{1}{2}} - 29673_{2\frac{1}{2}}$	−71
4173.147	2	MB	23955.979	$7278°_{1\frac{1}{2}} - 31234_{2\frac{1}{2}}$	22
4173.419	1	MB	23954.417		
4173.491	2	MB	23954.004	$14315°_{0\frac{1}{2}} - 38269_{0\frac{1}{2}}$	−37

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4173.949	6	*MB*	23951.376	$1410°_{4\frac{1}{2}} - 25361_{4\frac{1}{2}}$	6	4186.857	4	*MB*	23877.535	$12260°_{3\frac{1}{2}} - 36137_{2\frac{1}{2}}$	20
4174.134	5	*MB*	23950.314	$9198°_{3\frac{1}{2}} - 33148_{2\frac{1}{2}}$	51	4187.221	5	*MB*	23875.460	$6549°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	19
4174.223	1	*MB*	23949.803			4187.321	380	*MB*	23874.890	$4459°_{3\frac{1}{2}} - 28334_{4\frac{1}{2}}$	6
4174.331	2	*MB*	23949.184			4187.465	5	*MB*	23874.069		
4174.389	9	*MB*	23948.851	$7259°_{3\frac{1}{2}} - 31207_{3\frac{1}{2}}$	0	4187.570	4	*MB*	23873.470		
4174.470	80	*MB*	23948.387	$4737°_{2\frac{1}{2}} - 28685_{2\frac{1}{2}}$	2	4188.300	1	*MB*	23869.309		
4174.537	5	*MB*	23948.002	$7818°_{1\frac{1}{2}} - 31766_{1\frac{1}{2}}$	40	4188.435	6	*MB*	23868.540	$12057°_{2\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−34
4174.873	1	*MB*	23946.075			4188.661	4	*WA*	23867.252	$13784°_{1\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−4
4175.231	50	*MB*	23944.021	$5964°_{3\frac{1}{2}} - 29908_{4\frac{1}{2}}$	14	4188.866	1	*MB*	23866.084	$5924°_{1\frac{1}{2}} - 29790_{0\frac{1}{2}}$	18
4175.789	2	*MB*	23940.822			4189.181	35	*MB*	23864.289	$5942°_{3\frac{1}{2}} - 29807_{3\frac{1}{2}}$	10
4175.852	2	*MB*	23940.461			4189.250	2	*MB*	23863.896		
4175.944	9	*MB*	23939.934	$9634°_{1\frac{1}{2}} - 33574_{1\frac{1}{2}}$	−24	4189.527	3	*MB*	23862.319	$10114°_{2\frac{1}{2}} - 33977_{3\frac{1}{2}}$	62
				$5969°_{5\frac{1}{2}} - 29908_{4\frac{1}{2}}$	37	4189.637	40	*MB*	23861.692	$7293°_{6\frac{1}{2}} - 31155_{6\frac{1}{2}}$	7
4176.077	90	*MB*	23939.171	$3995°_{3\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−6	4190.294	3	*MB*	23857.951		
4176.384	1	*MB*	23937.411			4190.327	4	*MB*	23857.763	$8280°_{2\frac{1}{2}} - 32138_{2\frac{1}{2}}$	11
4176.518	3	*MB*	23936.643	$9723°_{4\frac{1}{2}} - 33659_{5\frac{1}{2}}$	10	4190.613	100	*MB*	23856.135		
4176.701	240	*MB*	23935.595	$9053_{3\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	6	4190.620	20	*MB*	23856.095	$7233°_{5\frac{1}{2}} - 31089_{5\frac{1}{2}}$	−8
4176.952	1	*MB*	23934.156			4190.833	4	*MB*	23854.882	$7713°_{4\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−47
4177.057	6	*MB*	23933.554			4191.028	40	*MB*	23853.772	$20783_{5\frac{1}{2}} - 44637°_{6\frac{1}{2}}$	17
4177.322	2	*MB*	23932.036			4191.347	9	*MB*	23851.957	$12260°_{3\frac{1}{2}} - 36112_{3\frac{1}{2}}$	24
4177.559	2	*MB*	23930.678			4191.491	1	*MB*	23851.138		
4177.827	3	*MB*	23929.144	$13659°_{4\frac{1}{2}} - 37588_{3\frac{1}{2}}$	0	4191.521	1	*MB*	23850.967		
4178.143	5	*MB*	23927.334	$5437°_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	16	4192.216	5	*MB*	23847.013		
4178.254	2	*MB*	23926.698	$11007°_{1\frac{1}{2}} - 34934_{2\frac{1}{2}}$	75	4192.244	1	*MB*	23846.853	$9198°_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	85
4179.074	10	*MB*	23922.004	$7233°_{5\frac{1}{2}} - 31155_{6\frac{1}{2}}$	8	4192.411	2	*MB*	23845.904		
4179.143	1	*MB*	23921.608			4192.473	4	*MB*	23845.551	$7713°_{4\frac{1}{2}} - 31558_{3\frac{1}{2}}$	14
4179.286	50	*MB*	23920.790	$3593°_{4\frac{1}{2}} - 27514_{3\frac{1}{2}}$	12	4192.523	2	*MB*	23845.267	$2634°_{2\frac{1}{2}} - 26479_{1\frac{1}{2}}$	7
4180.210	3	*MB*	23915.502	$8402°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−4	4192.755	15	*MB*	23843.947	$5437°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−4
4180.813	3	*MB*	23912.053	$17171°_{5\frac{1}{2}} - 41083_{4\frac{1}{2}}$	5	4193.060	140	*MB*	23842.213	$5964°_{3\frac{1}{2}} - 29807_{3\frac{1}{2}}$	31
4181.077	240	*MB*	23910.544	$5118°_{2\frac{1}{2}} - 29029_{1\frac{1}{2}}$	−2	4193.102	260	*MB*	23841.974	$8774_{4\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	19
										$7233°_{5\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−1
4181.217	3	*MB*	23909.743	$3995°_{3\frac{1}{2}} - 27905_{4\frac{1}{2}}$	46						
4181.483	7	*MB*	23908.222			4193.280	260	*MB*	23840.962	$8531_{3\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	19
4181.565	2	*MB*	23907.753	$6517°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	23	4193.870	260	*MB*	23837.608	$4459°_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	7
4181.633	1	*MB*	23907.364	$9269°_{0\frac{1}{2}} - 33177_{0\frac{1}{2}}$	−5	4194.733	2	*MB*	23832.704		
4181.940	1	*MB*	23905.609			4194.815	4	*MB*	23832.238	$13012°_{2\frac{1}{2}} - 36844_{2\frac{1}{2}}$	28
4182.215	8	*MB*	23904.038	$6521°_{1\frac{1}{2}} - 30425_{2\frac{1}{2}}$	21	4194.904	130	*MB*	23831.732	$9053_{3\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	−5
4182.504	1	*MB*	23902.386							$987°_{4\frac{1}{2}} - 24819_{3\frac{1}{2}}$	10
4182.672	5	*MB*	23901.426			4195.272	7	*MB*	23829.642	$5964°_{3\frac{1}{2}} - 29794_{3\frac{1}{2}}$	21
4182.940	2	*MB*	23899.894	$11325°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	20	4195.685	1	*MB*	23827.296		
4182.972	2	*MB*	23899.712	$7061°_{0\frac{1}{2}} - 30961_{1\frac{1}{2}}$	32	4195.700	4	*MB*	23827.211		
4183.391	1	*MB*	23897.318			4195.814	50	*MB*	23826.564	$4511°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	7
4184.367	3	*MB*	23891.744	$7278°_{1\frac{1}{2}} - 31170_{1\frac{1}{2}}$	21	4196.115	1	*MB*	23824.855		
4184.458	2	*MB*	23891.224			4196.330	450	*MB*	23823.634	$3363°_{2\frac{1}{2}} - 27187_{3\frac{1}{2}}$	14
4184.875	2	*MB*	23888.844			4196.575	5	*MB*	23822.243	$12466°_{1\frac{1}{2}} - 36288_{0\frac{1}{2}}$	14
4185.331	240	*MB*	23886.241	$3363°_{2\frac{1}{2}} - 27249_{2\frac{1}{2}}$	0	4197.131	1	*MB*	23819.088		
4185.816	1	*MB*	23883.474			4197.240	2	*MB*	23818.469		
4185.878	1	*MB*	23883.120			4197.507	100	*MB*	23816.954	$3995°_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	16
4186.133	2	*MB*	23881.665	$13012°_{2\frac{1}{2}} - 36893_{3\frac{1}{2}}$	−9	4197.578	10	*MB*	23816.551	$7259°_{3\frac{1}{2}} - 31075_{4\frac{1}{2}}$	23
4186.365	4	*MB*	23880.342	$10274°_{3\frac{1}{2}} - 34155_{3\frac{1}{2}}$	2	4197.666	130	*MB*	23816.052	$3995°_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	16
4186.596	2500	*MB*	23879.024	$6967_{6\frac{1}{2}} - 30846°_{7\frac{1}{2}}$	−10	4197.869	5	*MB*	23814.900	$17475°_{4\frac{1}{2}} - 41289_{5\frac{1}{2}}$	−47

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4197.993	200b	*MB*	23814.197	$4910°_{5/2}-28725_{4 1/2}$	12	4211.825	7	*MB*	23735.990	$8402°_{3 1/2}-32138_{2 1/2}$	−39
4198.298	3	*MB*	23812.467	$7746°_{2 1/2}-31558_{3 1/2}$	26	4211.907	2	*MB*	23735.528		
4198.427	130	*MB*	23811.735	$4523°_{4 1/2}-28334_{4 1/2}$	12	4211.966	2	*MB*	23735.196		
4198.643	200	*MB*	23810.510	$7341_{5 1/2}-31151°_{5 1/2}$	−16	4212.056	5	*MB*	23734.689		
4198.715	600	*MB*	23810.102	$4165_{4 1/2}-27975°_{4 1/2}$	33	4212.167	2	*MB*	23734.063		
4199.520	4	*MB*	23805.538			4212.620	2	*MB*	23731.511	$28327°_{5 1/2}-52058_{4 1/2}$	−4
4199.546	3	*WA*	23805.390	$11007°_{1 1/2}-34813_{2 1/2}$	−12	4212.644	5	*MB*	23731.376		
4199.582	1	*MB*	23805.186			4212.720	12	*MB*	23730.948	$5942°_{3 1/2}-29673_{2 1/2}$	−23
4200.360	1	*MB*	23800.777			4212.933	2	*MB*	23729.748		
4200.711	1	*MB*	23798.788			4213.039	70	*MB*	23729.151	$5437°_{3 1/2}-29166_{4 1/2}$	−23
4200.794	1	*MB*	23798.318			4213.198	20	*MB*	23728.255		
4201.055	1	*MB*	23796.840			4213.690	2	*MB*	23725.485		
4201.117	1	*MB*	23796.489			4214.038	260	*MB*	23723.525	$4910°_{5 1/2}-28634_{5 1/2}$	−27
4201.235	170	*MB*	23795.820	$7293°_{6 1/2}-31089_{5 1/2}$	28	4214.701	25	*MB*	23719.794	$5010°_{2 1/2}-28730_{3 1/2}$	−47
4201.320	70	*MB*	23795.339	$8402°_{3 1/2}-32197_{4 1/2}$	25	4215.419	20	*MB*	23715.754		
4201.596	2	*MB*	23793.776			4215.543	2	*MB*	23715.056		
4201.700	2	*MB*	23793.187			4215.612	20	*MB*	23714.668		
4202.090	1	*MB*	23790.979			4215.798	20	*MB*	23713.622		
4202.657	1	*MB*	23787.769	$10088°_{1 1/2}-33876_{1 1/2}$	32	4216.051	2	*MB*	23712.199	$16159°_{3 1/2}-39871_{4 1/2}$	−97
4202.709	4	*MB*	23787.475	$5651°_{5 1/2}-29438_{5 1/2}$	15	4216.511	2	*MB*	23709.612		
4202.926	325	*MB*	23786.247	$4511°_{2 1/2}-28297_{3 1/2}$	31	4216.630	7	*MB*	23708.943	$28349°_{3 1/2}-52058_{4 1/2}$	−61
4202.956	325	*MB*	23786.077	$3593°_{4 1/2}-27379_{5 1/2}$	10					$5964°_{3 1/2}-29673_{2 1/2}$	69
4203.164	2	*MB*	23784.900	$17300°_{3 1/2}-41085_{3 1/2}$	−3	4216.835	15	*MB*	23707.790		
4203.502	40	*MB*	23782.987	$17300°_{3 1/2}-41083_{4 1/2}$	3	4217.226	20	*MB*	23705.592	$10454°_{1 1/2}-34159_{0 1/2}$	−12
				$0°_{3 1/2}-23782_{2 1/2}$	−3	4217.590	220	*MB*	23703.547	$8531_{3 1/2}-32235°_{3 1/2}$	−13
4203.554	2	*MB*	23782.693			4217.836	20	*MB*	23702.164	$10274°_{3 1/2}-33977_{3 1/2}$	−4
4203.797	1	*MB*	23781.318			4218.321	5	*MB*	23699.439		
4203.933	2	*MB*	23780.549	$9269°_{0 1/2}-33050_{1 1/2}$	84	4218.473	5	*MB*	23698.585		
4204.716	25	*MB*	23776.120	$6389°_{4 1/2}-30166_{3 1/2}$	6	4218.833	10	*MB*	23696.563	$19946°_{1 1/2}-43643_{0 1/2}$	−98
4204.758	25	*MB*	23775.883	$10035°_{5 1/2}-33811_{4 1/2}$	27	4219.085	10	*MB*	23695.147		
4205.015	2	*MB*	23774.430	$4523°_{4 1/2}-28297_{3 1/2}$	−9	4219.214	5	*MB*	23694.423		
4205.157	40	*MB*	23773.627	$9778°_{2 1/2}-33552_{2 1/2}$	31	4219.260	5	*MB*	23694.165		
4205.450	1	*MB*	23771.971	$13758°_{1 1/2}-37530_{1 1/2}$	8	4219.392	25	*MB*	23693.424	$10114°_{2 1/2}-33808_{2 1/2}$	−9
4205.787	25	*MB*	23770.066	$7059°_{4 1/2}-30829_{3 1/2}$	14	4219.707	30	*MB*	23691.655	$10641°_{2 1/2}-34333_{2 1/2}$	0
4205.887	25	*MB*	23769.501	$10274°_{3 1/2}-34044_{4 1/2}$	31	4220.063	15	*MB*	23689.656	$7878°_{3 1/2}-31568_{4 1/2}$	−34
4206.825	6	*MB*	23764.201	$7278°_{1 1/2}-31043_{2 1/2}$	13	4220.189	20	*MB*	23688.949	$5675°_{4 1/2}-29364_{3 1/2}$	−27
4206.981	1	*MB*	23763.320			4220.406	2	*MB*	23687.731	$8804°_{4 1/2}-32492_{5 1/2}$	−82
4207.025	2	*MB*	23763.071	$5675°_{4 1/2}-29438_{5 1/2}$	17	4220.551	25	*MB*	23686.917	$17171°_{5 1/2}-40858_{4 1/2}$	−42
4207.590	1	*MB*	23759.881	$11007°_{1 1/2}-34767_{1 1/2}$	−10	4220.610	10	*MB*	23686.586	$9723°_{4 1/2}-33409_{3 1/2}$	24
4208.234	4	*MB*	23756.244	$20881_{6 1/2}-44637°_{6 1/2}$	32	4220.770	25	*MB*	23685.688	$9491°_{0 1/2}-33177_{0 1/2}$	−14
4208.234	4	*MB*	23756.244	$2595°_{1 1/2}-26351_{0 1/2}$	−22	4220.833	7	*MB*	23685.334		
4208.431	6	*MB*	23755.133			4221.173	40	*MB*	23683.427	$7061°_{0 1/2}-30745_{1 1/2}$	−20
4208.680	4	*MB*	23753.727	$7278°_{1 1/2}-31032_{0 1/2}$	38	4221.205	12	*MB*	23683.247		
4209.037	5	*MB*	23751.712			4221.324	17	*MB*	23682.580	$7278°_{1 1/2}-30961_{1 1/2}$	−15
4209.408	190	*MB*	23749.619	$5513_{5 1/2}-29263°_{5 1/2}$	−9	4221.383	15	*MB*	23682.249		
4209.991	50	*MB*	23746.330	$5283°_{0 1/2}-29029_{1 1/2}$	7	4221.452	10	*MB*	23681.862		
4210.085	10	*MB*	23745.800	$13784°_{1 1/2}-37530_{1 1/2}$	1	4221.484	20	*MB*	23681.682	$8169°_{1 1/2}-31851_{2 1/2}$	−16
4210.235	35	*MB*	23744.954	$6389°_{4 1/2}-30134_{5 1/2}$	−13	4221.730	12	*MB*	23680.302	$13515°_{3 1/2}-37196_{4 1/2}$	17
4210.291	7	*MB*	23744.638							$7878°_{3 1/2}-31558_{3 1/2}$	5
4211.585	30	*MB*	23737.343	$17851°_{0 1/2}-41589_{0 1/2}$	8	4222.362	7	*MB*	23676.758		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4222.598	1100	*MB*	23675.434	$987°_{4\frac{1}{2}} - 24663_{4\frac{1}{2}}$	−9	4236.744	12	*MB*	23596.386	$8169°_{1\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−24
4223.158	20	*MB*	23672.295	$9316_{3\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	−10	4236.903	7	*MB*	23595.501		
4223.256	5	*MB*	23671.746			4236.994	7	*MB*	23594.994	$11325°_{2\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−12
4223.361	5	*MB*	23671.157	$12466°_{1\frac{1}{2}} - 36137_{2\frac{1}{2}}$	−16	4237.065	5	*MB*	23594.599		
4223.587	5	*MB*	23669.891			4237.203	25	*MB*	23593.830	$11340°_{3\frac{1}{2}} - 34934_{2\frac{1}{2}}$	6
4223.752	30	*MB*	23668.966			4237.326	5	*MB*	23593.146	$3593°_{4\frac{1}{2}} - 27187_{3\frac{1}{2}}$	−18
4223.885	80	*MB*	23668.221	$4266°_{3\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−19	4237.649	2	*MB*	23591.347		
4224.359	7	*MB*	23665.565	$12260°_{3\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−28	4237.704	2	*MB*	23591.041		
4224.557	30	*MB*	23664.456	$9198°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	15	4237.796	25	*MB*	23590.529	$9269°_{0\frac{1}{2}} - 32860_{0\frac{1}{2}}$	2
4224.643	2	*MB*	23663.974			4237.851	12	*MB*	23590.223	$8175°_{2\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−22
4224.686	2	*MB*	23663.734			4238.176	17	*MB*	23588.414	$11340°_{3\frac{1}{2}} - 34928_{4\frac{1}{2}}$	43
4224.759	5	*MB*	23663.325			4238.353	5	*MB*	23587.429		
4225.189	10	*MB*	23660.917			4238.443	5	*MB*	23586.928		
4225.726	25	*MB*	23657.910	$7011_{4\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	12	4238.557	25	*MB*	23586.293	$3793°_{6\frac{1}{2}} - 27379_{5\frac{1}{2}}$	−21
4225.894	10	*MB*	23656.969			4239.035	25	*MB*	23583.634	$13758°_{1\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−22
4226.554	2	*MB*	23653.275			4239.109	5	*MB*	23583.222		
4227.415	70	*MB*	23648.458	$6517°_{2\frac{1}{2}} - 30166_{3\frac{1}{2}}$	20	4239.630	12	*MB*	23580.324		
4227.457	7	*MB*	23648.223	$7522°_{0\frac{1}{2}} - 31170_{1\frac{1}{2}}$	36	4239.652	30	*MB*	23580.202	$11340°_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	12
4227.747	550	*MB*	23646.601	$5616_{4\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	2	4239.717	5	*MB*	23579.840		
4228.296	60	*MB*	23643.530	$7059°_{4\frac{1}{2}} - 30702_{4\frac{1}{2}}$	−7	4239.909	700	*MB*	23578.773	$3854_{3\frac{1}{2}} - 27432°_{4\frac{1}{2}}$	3
4228.831	25	*MB*	23640.539	$0°_{3\frac{1}{2}} - 23640_{4\frac{1}{2}}$	−23	4240.157	12	*MB*	23577.394	$7092_{5\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	−42
4229.160	15	*MB*	23638.700	$4266°_{3\frac{1}{2}} - 27905_{4\frac{1}{2}}$	−59	4240.793	15	*MB*	23573.858		
4229.637	25	*MB*	23636.034			4240.866	15	*MB*	23573.452	$9723°_{4\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−17
4230.126	60	*MB*	23633.302	$4201°_{1\frac{1}{2}} - 27835_{1\frac{1}{2}}$	−37	4241.404	35	*MB*	23570.462	$8280°_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	11
4230.184	20	*MB*	23632.978	$7522°_{5\frac{1}{2}} - 31155_{6\frac{1}{2}}$	−23	4241.651	17	*MB*	23569.089	$7454_{1\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	−35
4230.555	30	*MB*	23630.906	$9778°_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−4	4241.746	30	*MB*	23568.562	$11458_{5\frac{1}{2}} - 35026°_{4\frac{1}{2}}$	−28
4230.961	2	*MB*	23628.638			4241.859	2	*MB*	23567.933		
4231.016	2	*MB*	23628.331			4242.013	60	*MB*	23567.078	$7522°_{5\frac{1}{2}} - 31089_{5\frac{1}{2}}$	−31
4231.171	20	*MB*	23627.465	$10798°_{2\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−16	4242.363	20	*MB*	23565.134	$5716°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−23
4231.334	17	*MB*	23626.555	$7202°_{2\frac{1}{2}} - 30829_{3\frac{1}{2}}$	−39	4242.721	280	*MB*	23563.145	$2382°_{4\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−4
4231.744	280	*MB*	23624.266	$10035°_{5\frac{1}{2}} - 33659_{5\frac{1}{2}}$	9	4242.863	30	*MB*	23562.357	$9053_{3\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	−32
4231.996	12	*MB*	23622.860	$7746°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	−47	4243.284	12	*MB*	23560.019	$3793°_{6\frac{1}{2}} - 27353_{7\frac{1}{2}}$	−16
4232.055	70	*MB*	23622.530	$7722_{2\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	−12	4243.312	17	*MB*	23559.863	$12365°_{4\frac{1}{2}} - 35925_{3\frac{1}{2}}$	−12
4232.387	2	*MB*	23620.677			4243.743	60b	*MB*	23557.471	$13784°_{1\frac{1}{2}} - 37342_{2\frac{1}{2}}$	−21
4232.562	100	*MB*	23619.700	$5819°_{4\frac{1}{2}} - 29438_{5\frac{1}{2}}$	−3	4244.055	2	*MB*	23555.739		
4233.197	60	*MB*	23616.157	$6549°_{2\frac{1}{2}} - 30166_{3\frac{1}{2}}$	9	4244.557	25	*MB*	23552.953	$7522°_{5\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−28
4233.273	5	*MB*	23615.733			4244.919	25	*MB*	23550.945	$7818°_{1\frac{1}{2}} - 31369_{2\frac{1}{2}}$	0
4233.960	30	*MB*	23611.902	$5118°_{2\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−3	4244.999	5	*MB*	23550.501		
4234.211	170	*MB*	23610.502	$4201°_{1\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−2	4245.069	5	*MB*	23550.113		
4234.393	15	*MB*	23609.487	$11949°_{3\frac{1}{2}} - 35558_{3\frac{1}{2}}$	−25	4245.537	25	*MB*	23547.517	$12260°_{3\frac{1}{2}} - 35807_{4\frac{1}{2}}$	37
										$6517°_{2\frac{1}{2}} - 30065_{3\frac{1}{2}}$	−27
4234.547	15	*MB*	23608.629	$11325°_{2\frac{1}{2}} - 34934_{2\frac{1}{2}}$	−12						
4234.729	60	*MB*	23607.614	$6638°_{4\frac{1}{2}} - 30245_{4\frac{1}{2}}$	−5	4245.812	30	*MB*	23545.991	$4266°_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−9
4235.099	5	*MB*	23605.552			4245.877	220	*MB*	23545.631	$5819°_{4\frac{1}{2}} - 29364_{3\frac{1}{2}}$	4
4235.151	5	*MB*	23605.262			4245.967	220	*MB*	23545.132	$4266°_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	33
4235.228	2	*MB*	23604.833			4246.359	25	*MB*	23542.958	$9634°_{1\frac{1}{2}} - 33177_{0\frac{1}{2}}$	−51
4235.625	2	*MB*	23602.620			4246.393	60	*MB*	23542.770	$7202°_{2\frac{1}{2}} - 30745_{1\frac{1}{2}}$	13
4235.881	10	*MB*	23601.194	$18147°_{2\frac{1}{2}} - 41748_{1\frac{1}{2}}$	−79	4246.712	280	*MB*	23541.002	$2140°_{0\frac{1}{2}} - 25681_{1\frac{1}{2}}$	6
4236.018	140	*MB*	23600.430	$4737°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−10	4246.935	25	*MB*	23539.765	$19920°_{3\frac{1}{2}} - 43460_{2\frac{1}{2}}$	46
4236.140	10	*MB*	23599.751			4246.994	2	*MB*	23539.438		
4236.356	60	*MB*	23598.547	$8774_{4\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	−9	4247.381	2	*MB*	23537.294		

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4247.445	50	MB	23536.939	$3363°_{2\frac{1}{2}}-26900_{3\frac{1}{2}}$	12	4257.124	80	MB	23483.426	$3703°_{3\frac{1}{2}}-27187_{3\frac{1}{2}}$	−26
4247.601	10	MB	23536.074			4257.462	15	MB	23481.562	$10684°_{0\frac{1}{2}}-34166_{1\frac{1}{2}}$	−35
4247.795	25	MB	23535.000	$8402°_{3\frac{1}{2}}-31937_{3\frac{1}{2}}$	15	4257.983	12	MB	23478.689		
4248.088	50	MB	23533.376	$10274°_{3\frac{1}{2}}-33808_{2\frac{1}{2}}$	31	4258.391	40	MB	23476.439	$6517°_{2\frac{1}{2}}-29994_{2\frac{1}{2}}$	18
4248.668	750	MB	23530.164	$5513_{5\frac{1}{2}}-29043°_{6\frac{1}{2}}$	19	4258.483	7	MB	23475.932	$17000_{3\frac{1}{2}}-40475°_{3\frac{1}{2}}$	15
4248.986	7	MB	23528.403	$12097_{3\frac{1}{2}}-35625°_{3\frac{1}{2}}$	−20	4258.696	30	MB	23474.758	$4459°_{3\frac{1}{2}}-27934_{4\frac{1}{2}}$	−7
4249.008	30	MB	23528.281	$8402°_{3\frac{1}{2}}-31930_{4\frac{1}{2}}$	13	4258.879	25	MB	23473.750	$13758°_{1\frac{1}{2}}-37232_{1\frac{1}{2}}$	−17
4249.104	20	MB	23527.749	$6638°_{4\frac{1}{2}}-30166_{3\frac{1}{2}}$	−49	4259.063	20	MB	23472.735	$6521°_{1\frac{1}{2}}-29994_{2\frac{1}{2}}$	27
4249.389	25	MB	23526.172			4259.305	7	MB	23471.402		
4249.500	15	MB	23525.557	$5924°_{1\frac{1}{2}}-29449_{1\frac{1}{2}}$	−16	4259.600	20	MB	23469.776	$5969°_{5\frac{1}{2}}-29438_{5\frac{1}{2}}$	−33
4249.553	15	MB	23525.264			4259.744	90	MB	23468.983	$7233°_{5\frac{1}{2}}-30702_{4\frac{1}{2}}$	0
4249.669	20	MB	23524.621	$10641°_{2\frac{1}{2}}-34166_{1\frac{1}{2}}$	25	4260.212	25	MB	23466.405	$7278°_{1\frac{1}{2}}-30745_{1\frac{1}{2}}$	41
4249.964	15	MB	23522.989							$6517°_{2\frac{1}{2}}-29984_{1\frac{1}{2}}$	−27
4250.258	2	MB	23521.361			4260.599	2	MB	23464.273		
4250.642	15	MB	23519.237	$3995°_{3\frac{1}{2}}-27514_{3\frac{1}{2}}$	37	4260.663	7	MB	23463.921	$10088°_{1\frac{1}{2}}-33552_{2\frac{1}{2}}$	−20
4250.690	10	MB	23518.971	$6389°_{4\frac{1}{2}}-29908_{4\frac{1}{2}}$	9	4260.889	5	MB	23462.676	$6521°_{1\frac{1}{2}}-29984_{1\frac{1}{2}}$	−43
4250.817	30	MB	23518.268	$9198°_{3\frac{1}{2}}-32716_{2\frac{1}{2}}$	−52	4261.064	17	MB	23461.713	$7746°_{2\frac{1}{2}}-31207_{3\frac{1}{2}}$	−28
4250.842	15	MB	23518.130	$8448_{2\frac{1}{2}}-31966°_{2\frac{1}{2}}$	23	4261.162	80	MB	23461.173	$8774_{4\frac{1}{2}}-32235°_{3\frac{1}{2}}$	−1
4250.987	2	MB	23517.328			4261.513	7	MB	23459.241	$10114°_{2\frac{1}{2}}-33574_{1\frac{1}{2}}$	−20
4251.236	2	MB	23515.950			4261.857	2	MB	23457.347		
4251.363	25	MB	23515.248	$6549°_{2\frac{1}{2}}-30065_{3\frac{1}{2}}$	−7	4262.060	2	MB	23456.230		
				$5651°_{5\frac{1}{2}}-29166_{4\frac{1}{2}}$	8	4262.097	7	MB	23456.027		
4251.599	40	MB	23513.943	$19946°_{1\frac{1}{2}}-43460_{2\frac{1}{2}}$	−21	4262.374	15	MB	23454.502	$3363°_{2\frac{1}{2}}-26817_{2\frac{1}{2}}$	−6
				$8804°_{4\frac{1}{2}}-32318_{3\frac{1}{2}}$	−7	4262.558	5	MB	23453.490		
4251.857	40	MB	23512.516	$4322°_{2\frac{1}{2}}-27835_{1\frac{1}{2}}$	−8	4263.065	15	MB	23450.700	$12751°_{5\frac{1}{2}}-36202_{4\frac{1}{2}}$	−74
4252.125	10	MB	23511.034			4263.138	17	MB	23450.299	$5716°_{3\frac{1}{2}}-29166_{4\frac{1}{2}}$	−81
4252.292	7	MB	23510.111	$7522°_{0\frac{1}{2}}-31032_{0\frac{1}{2}}$	−41	4263.424	140	MB	23448.726	$8402°_{3\frac{1}{2}}-31851_{2\frac{1}{2}}$	−2
4252.388	12	MB	23509.580			4263.631	15	MB	23447.588	$13784°_{1\frac{1}{2}}-37232_{1\frac{1}{2}}$	−15
4252.736	5	MB	23507.656			4263.949	50	MB	23445.839	$8789_{2\frac{1}{2}}-32235°_{3\frac{1}{2}}$	−19
4252.928	2	MB	23506.595			4264.057	25	MB	23445.245	$4459°_{3\frac{1}{2}}-27905_{4\frac{1}{2}}$	−39
4253.022	5	MB	23506.076			4264.369	120	MB	23443.530	$7259°_{3\frac{1}{2}}-30702_{4\frac{1}{2}}$	−4
4253.367	280	MB	23504.169	$3745°_{1\frac{1}{2}}-27249_{2\frac{1}{2}}$	−24	4264.494	5	MB	23442.842		
4253.426	10	MB	23503.843			4264.666	10	MB	23441.897	$11325°_{2\frac{1}{2}}-34767_{1\frac{1}{2}}$	−12
4253.703	15	MB	23502.312	$17171°_{5\frac{1}{2}}-40673_{5\frac{1}{2}}$	−17	4264.692	20	MB	23441.754	$12365°_{4\frac{1}{2}}-35807_{4\frac{1}{2}}$	−7
4253.837	20	MB	23501.572	$12057°_{2\frac{1}{2}}-35558_{3\frac{1}{2}}$	−22	4264.773	2	MB	23441.309		
4254.000	17	MB	23500.671	$4844°_{1\frac{1}{2}}-28345_{0\frac{1}{2}}$	0	4264.830	5	MB	23440.995		
4254.255	7	MB	23499.263			4265.028	7	MB	23439.907	$12762°_{4\frac{1}{2}}-36202_{4\frac{1}{2}}$	−8
4254.735	50b	MB	23496.612	$6638°_{4\frac{1}{2}}-30134_{5\frac{1}{2}}$	−39	4265.186	2	MT	23439.039	$7522°_{0\frac{1}{2}}-30961_{1\frac{1}{2}}$	−20
4254.907	35	MB	23495.662	$10035°_{5\frac{1}{2}}-33531_{6\frac{1}{2}}$	−14	4265.264	5	MB	23438.611		
4255.055	17	MB	23494.845	$7713°_{4\frac{1}{2}}-31207_{3\frac{1}{2}}$	7	4265.545	5	MB	23437.066		
4255.358	35	MB	23493.172	$4844°_{1\frac{1}{2}}-28337_{2\frac{1}{2}}$	2	4265.697	25	MB	23436.231	$8702°_{1\frac{1}{2}}-32138_{2\frac{1}{2}}$	−22
4255.612	10	MB	23491.770	$14481°_{2\frac{1}{2}}-37973_{3\frac{1}{2}}$	−70	4265.913	25	MB	23435.045	$8531_{3\frac{1}{2}}-31966°_{2\frac{1}{2}}$	−24
4255.684	15	MB	23491.372			4266.078	20	MB	23434.138	$6549°_{2\frac{1}{2}}-29984_{1\frac{1}{2}}$	−5
4255.779	440	MB	23490.848	$5675°_{4\frac{1}{2}}-29166_{4\frac{1}{2}}$	14	4266.333	20	MB	23432.738		
4255.991	50	MB	23489.678	$4322°_{2\frac{1}{2}}-27812_{2\frac{1}{2}}$	−11	4266.536	2	MB	23431.623		
4256.151	120	MB	23488.795	$4322°_{2\frac{1}{2}}-27811_{3\frac{1}{2}}$	7	4266.685	7	MB	23430.804		
4256.352	20	MB	23487.686	$1873°_{3\frac{1}{2}}-25361_{4\frac{1}{2}}$	−53	4267.219	70	MB	23427.872	$4523°_{4\frac{1}{2}}-27950_{5\frac{1}{2}}$	15
4256.404	15	MB	23487.399	$11325°_{2\frac{1}{2}}-34813_{2\frac{1}{2}}$	−21	4267.402	20	MB	23426.868	$6638°_{4\frac{1}{2}}-30065_{3\frac{1}{2}}$	−37
4256.710	15	MB	23485.710	$1873°_{3\frac{1}{2}}-25359_{2\frac{1}{2}}$	−41	4267.665	15	MB	23425.424	$11387°_{3\frac{1}{2}}-34813_{2\frac{1}{2}}$	−46
4256.880	7	MB	23484.772			4267.846	25	MB	23424.431	$7746°_{2\frac{1}{2}}-31170_{1\frac{1}{2}}$	−28

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4268.112	2	*MB*	23422.971			4277.684	30	*MB*	23370.559	$10924°_{4\frac{1}{2}} - 34295_{4\frac{1}{2}}$	−14
4268.298	40	*MB*	23421.950	$5942°_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	8	4277.857	25	*MB*	23369.614	$9778°_{2\frac{1}{2}} - 33148_{2\frac{1}{2}}$	11
4268.993	15	*MB*	23418.137			4277.954	2	*MB*	23369.084		
4269.175	25	*MB*	23417.139	$6389°_{4\frac{1}{2}} - 29807_{3\frac{1}{2}}$	3	4277.999	7	*MB*	23368.838	$9491°_{0\frac{1}{2}} - 32860_{0\frac{1}{2}}$	−21
4269.256	100	*MB*	23416.694	$7818°_{1\frac{1}{2}} - 31234_{2\frac{1}{2}}$	−37	4278.247	30	*MB*	23367.484	$10798°_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	0
4269.355	7	*MB*	23416.152	$9634°_{1\frac{1}{2}} - 33050_{1\frac{1}{2}}$	47	4278.325	7	*MB*	23367.058	$14827_{3\frac{1}{2}} - 38194°_{4\frac{1}{2}}$	−46
4269.375	15	*MB*	23416.042			4278.415	5	*MB*	23366.566	$14481°_{2\frac{1}{2}} - 37848_{2\frac{1}{2}}$	−53
4269.462	5	*MB*	23415.565			4278.738	2	*MB*	23364.802		
4269.535	7	*MB*	23415.164			4278.863	140	*MB*	23364.120	$2581°_{4\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−18
4269.570	30	*MB*	23414.972			4279.161	25	*MB*	23362.493	$7713°_{4\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−20
4269.842	5	*MB*	23413.481			4279.946	17	*MB*	23358.208	$7278°_{1\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−26
4269.970	2	*MB*	23412.779			4280.139	100	*MB*	23357.155	$5924°_{1\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−14
4270.186	440	*MB*	23411.595	$4523°_{4\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−9	4280.181	5	*MB*	23356.925		
4270.312	15	*MB*	23410.904	$9634°_{1\frac{1}{2}} - 33045_{2\frac{1}{2}}$	−4	4280.319	25	*MB*	23356.172	$9723°_{4\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−4
4270.714	280	*MB*	23408.700	$7722_{2\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	3	4280.711	12	*MB*	23354.033	$10454°_{1\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−11
4270.842	15	*MB*	23407.999	$13515°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	63	4280.989	80	*MB*	23352.517	$7818°_{1\frac{1}{2}} - 31170_{1\frac{1}{2}}$	19
4271.058	25	*MB*	23406.815	$11454_{6\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	−9					$4459°_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−8
4271.216	2	*MB*	23405.949			4281.153	60	*MB*	23351.622	$4459°_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−1
4271.473	25	*MB*	23404.541	$6389°_{4\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−33	4281.404	12	*MB*	23350.253	$12365°_{4\frac{1}{2}} - 35716_{5\frac{1}{2}}$	−23
4271.602	10	*MB*	23403.834			4281.562	17	*MB*	23349.392	$12762°_{4\frac{1}{2}} - 36112_{3\frac{1}{2}}$	12
4271.727	25	*MB*	23403.149	$11458_{5\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	−23	4281.905	40	*MB*	23347.522	$5819°_{4\frac{1}{2}} - 29166_{4\frac{1}{2}}$	38
4272.225	10	*MB*	23400.421			4282.015	20	*MB*	23346.922		
4272.263	7	*MB*	23400.213	$12057°_{2\frac{1}{2}} - 35457_{1\frac{1}{2}}$	2	4282.322	15	*MB*	23345.248		
4272.336	20	*MB*	23399.813	$5964°_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−30	4283.165	12	*MB*	23340.653		
4272.397	2	*MB*	23399.479			4283.553	30	*MB*	23338.539	$5942°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−36
4272.533	20	*MB*	23398.734			4284.076	17	*MB*	23335.690	$10641°_{2\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−7
4272.676	2	*MB*	23397.951			4284.319	20	*MB*	23334.367	$25753_{6\frac{1}{2}} - 49087°_{7\frac{1}{2}}$	−19
4272.835	10	*MB*	23397.080	$11949°_{3\frac{1}{2}} - 35346_{3\frac{1}{2}}$	−12	4284.444	5	*MB*	23333.686		
4272.995	25	*MB*	23396.204			4284.750	2	*MB*	23332.019		
4273.443	90	*MB*	23393.752	$8804°_{4\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−5	4285.197	25	*MB*	23329.585	$7878°_{3\frac{1}{2}} - 31207_{3\frac{1}{2}}$	−13
4273.935	7	*MB*	23391.059			4285.363	200	*MB*	23328.682	$7341_{5\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	−12
4274.094	10	*MB*	23390.189			4285.680	15	*MB*	23326.956	$5010°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	13
4274.540	30	*MB*	23387.748	$19946°_{1\frac{1}{2}} - 43334_{0\frac{1}{2}}$	−17	4285.981	20	*MB*	23325.318	$11007°_{1\frac{1}{2}} - 34333_{2\frac{1}{2}}$	19
4274.760	15	*MB*	23386.545			4286.240	7	*MB*	23323.909	$4511°_{2\frac{1}{2}} - 27835_{1\frac{1}{2}}$	−66
4275.134	15	*MB*	23384.499			4286.455	15	*MB*	23322.739	$19136°_{2\frac{1}{2}} - 42458_{1\frac{1}{2}}$	20
4275.208	10	*MB*	23384.094			4286.504	17	*MB*	23322.472	$14481°_{2\frac{1}{2}} - 37804_{1\frac{1}{2}}$	−31
4275.386	30	*MB*	23383.120	$17475°_{4\frac{1}{2}} - 40858_{4\frac{1}{2}}$	−61	4286.646	2	*MB*	23321.700		
4275.450	50	*MB*	23382.770	$8175°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	8	4286.922	20	*MB*	23320.198	$19138°_{1\frac{1}{2}} - 42458_{1\frac{1}{2}}$	−10
4275.564	100	*MB*	23382.147	$4523°_{4\frac{1}{2}} - 27905_{4\frac{1}{2}}$	23					$13758°_{1\frac{1}{2}} - 37078_{1\frac{1}{2}}$	−10
4275.905	5	*MB*	23380.282			4287.144	25	*MB*	23318.991	$9053_{3\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	0
4276.014	5	*MB*	23379.686			4287.452	7	*MB*	23317.316		
4276.207	2	*MB*	23378.631			4287.606	25	*MB*	23316.478	$5964°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	0
4276.317	17	*MB*	23378.030	$7259°_{3\frac{1}{2}} - 30637_{2\frac{1}{2}}$	−51	4287.789	5	*MB*	23315.483		
4276.336	7	*MB*	23377.926	$13515°_{3\frac{1}{2}} - 36893_{3\frac{1}{2}}$	9	4287.948	2	*MB*	23314.618	$9725_{3\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	−1
4276.459	5	*MB*	23377.254			4288.662	140	*MB*	23310.737	$2634°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	7
4276.566	12	*MB*	23376.669	$7713°_{4\frac{1}{2}} - 31089_{5\frac{1}{2}}$	27	4288.873	12	*MB*	23309.590		
4276.680	5	*MB*	23376.046			4289.019	5	*MB*	23308.797		
4276.787	7	*MB*	23375.461			4289.277	10	*MB*	23307.395		
4277.332	2	*MB*	23372.482	$15565°_{2\frac{1}{2}} - 38937_{1\frac{1}{2}}$	91	4289.444	140	*MB*	23306.487	$3593°_{4\frac{1}{2}} - 26900_{3\frac{1}{2}}$	16
4277.369	5	*MB*	23372.280			4289.595	40	*MB*	23305.667		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4289.935	1400	*MB*	23303.820	$2641°_{3\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−16	4301.743	2	*MB*	23239.854		
4290.429	35	*MB*	23301.137	$4511°_{2\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−3	4301.774	2	*MB*	23239.686		
4290.596	30	*MB*	23300.230	$4511°_{2\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−8	4301.995	7	*MB*	23238.492		
4290.670	10	*MB*	23299.828	$14315°_{0\frac{1}{2}} - 37615_{0\frac{1}{2}}$	26	4302.115	7	*MB*	23237.844		
4290.895	25	*MB*	23298.606	$8448_{2\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	4	4302.159	10	*MB*	23237.606	$9269°_{0\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−9
				$12260°_{3\frac{1}{2}} - 35558_{3\frac{1}{2}}$	−7	4302.199	7	*MB*	23237.390		
4291.213	5	*MB*	23296.880	$7746°_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−44	4302.565	7	*MB*	23235.414	$16159°_{3\frac{1}{2}} - 39394_{3\frac{1}{2}}$	−42
4291.556	20	*MB*	23295.018	$10114°_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	4	4302.653	60	*MB*	23234.938	$10641°_{2\frac{1}{2}} - 33876_{1\frac{1}{2}}$	4
4291.740	7	*MB*	23294.019	$13784°_{1\frac{1}{2}} - 37078_{1\frac{1}{2}}$	−25	4303.235	7	*MB*	23231.796		
4291.879	15	*MB*	23293.265	$5437°_{3\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−24	4303.584	2	*MB*	23229.912		
4292.044	7	*MB*	23292.369			4303.834	5	*MB*	23228.563		
4292.579	80	*MB*	23289.466	$6517°_{2\frac{1}{2}} - 29807_{3\frac{1}{2}}$	7	4304.178	5	*MB*	23226.706		
4292.763	80	*MB*	23288.468	$4523°_{4\frac{1}{2}} - 27811_{3\frac{1}{2}}$	5	4304.277	80	*MB*	23226.172	$9634°_{1\frac{1}{2}} - 32860_{0\frac{1}{2}}$	5
4292.901	25	*MB*	23287.719	$5437°_{3\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−6	4304.718	110	*MB*	23223.793	$5942°_{3\frac{1}{2}} - 29166_{4\frac{1}{2}}$	−5
4293.108	15	*MB*	23286.597	$5010°_{2\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−5	4304.901	40	*MB*	23222.805	$7522°_{0\frac{1}{2}} - 30745_{1\frac{1}{2}}$	−22
										$7202°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−14
4293.460	12	*MB*	23284.687								
4293.657	5	*MB*	23283.619			4305.140	300	*MB*	23221.516	$6913°_{6\frac{1}{2}} - 30134_{5\frac{1}{2}}$	−1
4293.869	2	*MB*	23282.469			4305.308	20	*MB*	23220.610		
4294.005	2	*MB*	23281.732			4305.608	35	*MB*	23218.992	$5118°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−15
4294.461	2	*MB*	23279.260			4305.801	5	*MB*	23217.952		
4294.753	50	*MB*	23277.677	$21373_{1\frac{1}{2}} - 44651°_{1\frac{1}{2}}$	−2	4305.835	7	*MB*	23217.768		
				$8280°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−2	4306.033	7	*MB*	23216.700		
4294.898	30	*MB*	23276.891	$6517°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−6	4306.288	20	*MB*	23215.326	$7746°_{2\frac{1}{2}} - 30961_{1\frac{1}{2}}$	−6
4295.094	7	*MB*	23275.829			4306.352	10	*MB*	23214.981	$9198°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−38
4295.446	5	*MB*	23273.922			4306.408	25	*MB*	23214.679	$14315°_{0\frac{1}{2}} - 37530_{1\frac{1}{2}}$	−21
4295.532	7	*MB*	23273.456			4306.452	7	*MB*	23214.442	$7818°_{1\frac{1}{2}} - 31032_{0\frac{1}{2}}$	−21
4295.935	17	*MB*	23271.273	$9778°_{2\frac{1}{2}} - 33050_{1\frac{1}{2}}$	−31	4306.722	550	*MB*	23212.986	$4165_{4\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	22
4296.052	50	*MB*	23270.639	$6638°_{4\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−6	4307.080	20	*MB*	23211.057		
4296.081	140	*MB*	23270.482	$8927°_{5\frac{1}{2}} - 32197_{4\frac{1}{2}}$	14	4307.612	12	*MB*	23208.190		
4296.367	30	*MB*	23268.933	$6521°_{1\frac{1}{2}} - 29790_{0\frac{1}{2}}$	−4	4308.226	7	*MB*	23204.883	$10703_{4\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	−4
4296.680	1100	*MB*	23267.238	$4165_{4\frac{1}{2}} - 27432°_{4\frac{1}{2}}$	6	4308.396	12	*MB*	23203.967		
4296.778	300	*MB*	23266.707	$6913°_{6\frac{1}{2}} - 30180_{6\frac{1}{2}}$	3	4308.708	5	*MB*	23202.287		
4296.884	30	*MB*	23266.133	$9778°_{2\frac{1}{2}} - 33045_{2\frac{1}{2}}$	24	4308.818	7	*MB*	23201.695	$5964°_{3\frac{1}{2}} - 29166_{4\frac{1}{2}}$	−5
4297.193	25	*MB*	23264.460	$13659°_{4\frac{1}{2}} - 36923_{4\frac{1}{2}}$	0	4309.118	5	*MB*	23200.080		
4297.243	2	*MB*	23264.190			4309.246	25	*MB*	23199.391	$8169°_{1\frac{1}{2}} - 31369_{2\frac{1}{2}}$	−3
4297.367	5	*MB*	23263.518	$9725_{3\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	33	4309.577	80	*MB*	23197.609	$5969°_{5\frac{1}{2}} - 29166_{4\frac{1}{2}}$	19
4297.569	15	*MB*	23262.425			4309.735	280	*MB*	23196.758	$3703°_{3\frac{1}{2}} - 26900_{3\frac{1}{2}}$	−1
4297.813	20	*MB*	23261.104	$10035°_{5\frac{1}{2}} - 33296_{4\frac{1}{2}}$	10	4310.246	15	*MB*	23194.008		
4297.937	5	*MB*	23260.433			4310.393	20	*MB*	23193.217	$8175°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	−12
4298.172	20	*MB*	23259.161	$15576_{1\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	−4	4310.635	25	*MB*	23191.915	$10684°_{0\frac{1}{2}} - 33876_{1\frac{1}{2}}$	−20
4298.472	7	*MB*	23257.538			4310.696	110	*MB*	23191.587	$3995°_{3\frac{1}{2}} - 27187_{3\frac{1}{2}}$	0
4298.823	17	*MB*	23255.639			4310.948	10	*MB*	23190.231	$2563°_{5\frac{1}{2}} - 25753_{6\frac{1}{2}}$	−28
4299.090	50	*MB*	23254.195	$3995°_{3\frac{1}{2}} - 27249_{2\frac{1}{2}}$	−13	4311.593	80	*MB*	23186.762	$11742°_{5\frac{1}{2}} - 34928_{4\frac{1}{2}}$	38
4299.357	420	*MB*	23252.751	$1410°_{4\frac{1}{2}} - 24663_{4\frac{1}{2}}$	0					$7059°_{4\frac{1}{2}} - 30245_{4\frac{1}{2}}$	−43
4299.986	2	*MB*	23249.349			4311.839	2	*MB*	23185.439		
4300.188	30	*MB*	23248.257	$4266°_{3\frac{1}{2}} - 27514_{3\frac{1}{2}}$	−5	4312.228	2	*MB*	23183.348		
4300.327	550	*MB*	23247.506	$3593°_{4\frac{1}{2}} - 26841_{4\frac{1}{2}}$	4	4312.339	7	*MB*	23182.751		
4300.861	30	*MB*	23244.619	$6549°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	10	4312.556	17	*MB*	23181.585	$9053_{3\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	−24
4301.217	10	*MB*	23242.696			4312.777	5	*MB*	23180.397		
4301.637	5	*MB*	23240.426			4312.857	20	*MB*	23179.967	$7522°_{5\frac{1}{2}} - 30702_{4\frac{1}{2}}$	−21

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4313.102	25	MB	23178.650	$5118°_{2\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−16	4325.109	25	MB	23114.305	$3703°_{3\frac{1}{2}} - 26817_{2\frac{1}{2}}$	−36
4313.225	2	MB	23177.989			4325.679	5	MB	23111.259		
4313.346	2	MB	23177.339	$8789_{2\frac{1}{2}} - 31966°_{2\frac{1}{2}}$	−28	4325.768	7	MB	23110.783		
4313.593	30	MB	23176.012	$4203°_{6\frac{1}{2}} - 27379_{5\frac{1}{2}}$	−2	4325.923	2	MB	23109.955	$2382°_{4\frac{1}{2}} - 25492_{5\frac{1}{2}}$	−49
4313.793	12	MB	23174.937			4326.058	2	MB	23109.234		
4313.857	12	MB	23174.593	$14963°_{5\frac{1}{2}} - 38137_{5\frac{1}{2}}$	12	4326.176	2	MB	23108.604		
4314.471	30	MB	23171.295	$14963°_{5\frac{1}{2}} - 38134_{4\frac{1}{2}}$	−4	4326.320	2	MB	23107.835		
4314.629	7	MB	23170.447			4326.480	20	MB	23106.980	$7059°_{4\frac{1}{2}} - 30166_{3\frac{1}{2}}$	−4
4314.933	40	MB	23168.815	$6638°_{4\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−4	4326.565	25	MB	23106.526	$14481°_{2\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−16
4314.978	20	MB	23168.573	$12057°_{2\frac{1}{2}} - 35225_{2\frac{1}{2}}$	24	4326.821	50	MB	23105.159	$5924°_{1\frac{1}{2}} - 29029_{1\frac{1}{2}}$	10
4315.295	30	MB	23166.871	$10641°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−3	4327.402	15	MB	23102.057	$11759_{5\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	−1
4315.405	70	MB	23166.281	$7259°_{3\frac{1}{2}} - 30425_{2\frac{1}{2}}$	7	4327.497	20	MB	23101.550		
4315.484	17	MB	23165.856	$987°_{4\frac{1}{2}} - 24153_{3\frac{1}{2}}$	2	4327.737	20	MB	23100.269	$11325°_{2\frac{1}{2}} - 34426_{2\frac{1}{2}}$	13
4315.584	12	MB	23165.320	$8402°_{3\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−30	4327.799	17	MB	23099.938	$13012°_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	12
4315.683	30	MB	23164.788	$7878°_{3\frac{1}{2}} - 31043_{2\frac{1}{2}}$	7	4327.941	7	MB	23099.180		
4316.006	17	MB	23163.055	$12762°_{4\frac{1}{2}} - 35925_{3\frac{1}{2}}$	14	4328.104	7	MB	23098.310	$10454°_{1\frac{1}{2}} - 33552_{2\frac{1}{2}}$	0
4316.401	20	MB	23160.935			4328.153	2	MB	23098.048		
4316.638	5	MB	23159.663	$9725_{3\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	30	4328.186	12	MB	23097.873	$4737°_{2\frac{1}{2}} - 27835_{1\frac{1}{2}}$	13
4316.761	12	MB	23159.004			4329.220	2	MB	23092.356		
4316.903	7	MB	23158.242	$11007°_{1\frac{1}{2}} - 34166_{1\frac{1}{2}}$	2	4329.552	2	MB	23090.585		
4317.269	25	MB	23156.279	$6638°_{4\frac{1}{2}} - 29794_{3\frac{1}{2}}$	20	4329.930	25	MB	23088.569	$10088°_{1\frac{1}{2}} - 33177_{0\frac{1}{2}}$	14
4317.329	100	MB	23155.957	$8402°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	0	4330.282	2	MB	23086.693		
4317.717	15	MB	23153.876			4330.438	220	MB	23085.861	$2595°_{1\frac{1}{2}} - 25681_{1\frac{1}{2}}$	17
4317.986	40	MB	23152.433	$6521°_{1\frac{1}{2}} - 29673_{2\frac{1}{2}}$	−4	4330.830	7	MB	23083.771	$9778°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−9
4318.049	20	MB	23152.096	$11007°_{1\frac{1}{2}} - 34159_{0\frac{1}{2}}$	18	4330.985	2	WA	23082.945	$7746°_{2\frac{1}{2}} - 30829_{3\frac{1}{2}}$	6
4318.226	2	MB	23151.147			4331.334	5	MB	23081.085		
4318.636	30	MB	23148.949	$8702°_{1\frac{1}{2}} - 31851_{2\frac{1}{2}}$	−3	4331.572	5	MB	23079.817		
4319.066	20	MB	23146.644	$9491°_{0\frac{1}{2}} - 32638_{1\frac{1}{2}}$	−27	4331.754	110	MB	23078.848	$9723°_{4\frac{1}{2}} - 32802_{5\frac{1}{2}}$	18
4319.104	20	MB	23146.441	$7278°_{1\frac{1}{2}} - 30425_{2\frac{1}{2}}$	14	4331.944	25	MB	23077.835	$10798°_{2\frac{1}{2}} - 33876_{1\frac{1}{2}}$	14
4319.682	17	MB	23143.344	$7818°_{1\frac{1}{2}} - 30961_{1\frac{1}{2}}$	−26	4332.017	2	MB	23077.446		
4319.828	5	MB	23142.561			4332.160	5	MB	23076.685		
4320.167	12	MB	23140.745	$12057°_{2\frac{1}{2}} - 35197_{1\frac{1}{2}}$	13	4332.318	17	MB	23075.843	$7059°_{4\frac{1}{2}} - 30134_{5\frac{1}{2}}$	5
4320.415	2	MB	23139.417	$9723°_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−14	4332.469	20	MB	23075.039	$4737°_{2\frac{1}{2}} - 27812_{2\frac{1}{2}}$	14
4320.720	400	MB	23137.784	$3703°_{3\frac{1}{2}} - 26841_{4\frac{1}{2}}$	−5	4332.639	30	MB	23074.133	$4737°_{2\frac{1}{2}} - 27811_{3\frac{1}{2}}$	11
4320.975	1	MB	23136.418			4332.703	220	MB	23073.792	$5651°_{5\frac{1}{2}} - 28725_{4\frac{1}{2}}$	2
4321.255	35	MB	23134.919	$10274°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	−6	4333.234	30	MB	23070.965		
4321.813	10	MB	23131.932	$15529_{2\frac{1}{2}} - 38661°_{1\frac{1}{2}}$	−11	4333.774	7	MB	23068.090		
4322.018	2	MB	23130.835			4334.034	2	MB	23066.707		
4322.512	2	MB	23128.191			4334.320	20	MB	23065.185	$8169°_{1\frac{1}{2}} - 31234_{2\frac{1}{2}}$	4
4322.790	30	MB	23126.704	$8804°_{4\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−7	4334.626	25	MB	23063.556		
4323.203	15	MB	23124.495	$17976_{2\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	−23	4334.857	50b	MB	23062.327	$8278_{5\frac{1}{2}} - 31340°_{6\frac{1}{2}}$	−11
4323.765	2	MB	23121.489			4335.389	17	MB	23059.497	$13784°_{1\frac{1}{2}} - 36844_{2\frac{1}{2}}$	27
4323.863	2	MB	23120.965			4335.478	40	MB	23059.024	$8175°_{2\frac{1}{2}} - 31234_{2\frac{1}{2}}$	8
4323.907	7	MB	23120.730			4335.799	2	MB	23057.317		
4324.020	7	MB	23120.126			4335.953	2	MB	23056.498	$23640_{4\frac{1}{2}} - 46697°_{4\frac{1}{2}}$	−22
4324.070	15	MB	23119.858	$9198°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	10	4336.085	17	MB	23055.796	$12751°_{5\frac{1}{2}} - 35807_{4\frac{1}{2}}$	10
				$10454°_{1\frac{1}{2}} - 33574_{1\frac{1}{2}}$	−14	4336.242	170	MB	23054.961	$5675°_{4\frac{1}{2}} - 28730_{3\frac{1}{2}}$	13
4324.124	17	MB	23119.570	$10924°_{4\frac{1}{2}} - 34044_{4\frac{1}{2}}$	5	4336.272	110	MB	23054.802	$4459°_{3\frac{1}{2}} - 27514_{3\frac{1}{2}}$	14
4324.345	12	MB	23118.388			4336.498	25	MB	23053.600		
4324.785	110	MB	23116.036	$7713°_{4\frac{1}{2}} - 30829_{3\frac{1}{2}}$	2	4336.746	12	MB	23052.282	$10924°_{4\frac{1}{2}} - 33977_{3\frac{1}{2}}$	18

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4336.847	20	*MB*	23051.745			4350.389	17	*MB*	22979.990		
4337.137	5	*MB*	23050.204	$19483_{2\,1/2} - 42533°_{1\,1/2}$	−29	4350.494	30	*MB*	22979.436	$2382°_{4\,1/2} - 25361_{4\,1/2}$	8
4337.290	2	*MB*	23049.391	$5675°_{4\,1/2} - 28725_{4\,1/2}$	6	4350.930	5	*MB*	22977.133		
4337.388	20	*MB*	23048.870	$6389°_{4\,1/2} - 29438_{5\,1/2}$	−4	4351.367	10	*MB*	22974.826	$6389°_{4\,1/2} - 29364_{3\,1/2}$	28
4337.595	25	*MB*	23047.770	$4201°_{1\,1/2} - 27249_{2\,1/2}$	−5	4351.664	10	*MB*	22973.258		
4337.773	700	*MB*	23046.824	$2634°_{2\,1/2} - 25681_{1\,1/2}$	2	4351.975	12	*MB*	22971.616	$11949°_{3\,1/2} - 34920_{3\,1/2}$	17
4338.129	17	*MB*	23044.933	$12762°_{4\,1/2} - 35807_{4\,1/2}$	6	4352.020	7	*MB*	22971.378	$3508°_{0\,1/2} - 26479_{1\,1/2}$	−72
4338.193	5	*MB*	23044.593	$9269°_{0\,1/2} - 32314_{0\,1/2}$	−49	4352.373	1	*WA*	22969.515	$5716°_{3\,1/2} - 28685_{2\,1/2}$	−26
4338.955	12	*MB*	23040.546			4352.704	400	*MB*	22967.769	$4844°_{1\,1/2} - 27812_{2\,1/2}$	15
4339.071	25	*MB*	23039.930	$4910°_{5\,1/2} - 27950_{5\,1/2}$	2	4352.956	25	*MB*	22966.439	$8402°_{3\,1/2} - 31369_{2\,1/2}$	14
4339.312	240	*MB*	23038.650	$10869_{4\,1/2} - 33908°_{4\,1/2}$	−1	4353.116	25	*MB*	22965.595	$12260°_{3\,1/2} - 35225_{2\,1/2}$	27
4339.566	2	*MB*	23037.302			4353.360	120	*MB*	22964.308	$12751°_{5\,1/2} - 35716_{5\,1/2}$	7
4339.655	5	*MB*	23036.830			4353.505	25	*MB*	22963.543	$7202°_{2\,1/2} - 30166_{3\,1/2}$	15
4340.139	25	*MB*	23034.261			4353.864	30	*MB*	22961.649	$10088°_{1\,1/2} - 33050_{1\,1/2}$	−1
4340.202	7	*MB*	23033.927			4353.975	15	*MB*	22961.064		
4340.554	50	*MB*	23032.058	$8175°_{2\,1/2} - 31207_{3\,1/2}$	−5	4354.085	20	*MB*	22960.484		
4341.292	7	*MB*	23028.143			4354.378	7	*MB*	22958.939	$2140°_{0\,1/2} - 25099_{1\,1/2}$	−50
4341.321	7	*MB*	23027.989			4354.419	17	*MB*	22958.723	$5675°_{4\,1/2} - 28634_{5\,1/2}$	−29
4341.452	2	*MB*	23027.295			4354.584	2	*MB*	22957.853	$8789_{2\,1/2} - 31747°_{1\,1/2}$	−9
4341.573	2	*MB*	23026.653			4354.724	7	*MB*	22957.115		
4341.731	2	*MB*	23025.815			4354.852	25	*MB*	22956.440	$10088°_{1\,1/2} - 33045_{2\,1/2}$	−14
4342.140	40	*MB*	23023.646	$4910°_{5\,1/2} - 27934_{4\,1/2}$	−28	4355.156	12	*MB*	22954.838	$11340°_{3\,1/2} - 34295_{4\,1/2}$	−13
4342.478	50	*MB*	23021.854	$10274°_{3\,1/2} - 33296_{4\,1/2}$	20	4355.339	17	*MB*	22953.873	$8280°_{2\,1/2} - 31234_{2\,1/2}$	−59
4342.761	1	*MB*	23020.354	$8131_{4\,1/2} - 31151°_{5\,1/2}$	37	4355.425	30	*MB*	22953.420	$12762°_{4\,1/2} - 35716_{5\,1/2}$	−21
4342.949	5	*MB*	23019.357			4355.530	7	*MB*	22952.867		
4343.119	7	*MB*	23018.456			4355.920	15	*MB*	22950.812	$7878°_{3\,1/2} - 30829_{3\,1/2}$	16
4343.702	25	*MB*	23015.367			4356.060	5	*MB*	22950.074		
4343.863	30	*MB*	23014.514	$5716°_{3\,1/2} - 28730_{3\,1/2}$	18	4356.334	2	*MB*	22948.631		
4344.015	5	*MB*	23013.708	$15822_{3\,1/2} - 38835°_{2\,1/2}$	34	4356.534	5	*MB*	22947.577	$23640_{4\,1/2} - 46588°_{5\,1/2}$	9
4344.289	30	*MB*	23012.257	$7233°_{5\,1/2} - 30245_{4\,1/2}$	6	4356.745	25	*MB*	22946.466	$7233°_{5\,1/2} - 30180_{6\,1/2}$	−2
4344.765	17	*MB*	23009.736	$10798°_{2\,1/2} - 33808_{2\,1/2}$	−25	4356.957	20	*MB*	22945.349	$11387°_{3\,1/2} - 34333_{2\,1/2}$	−17
4344.915	25	*MB*	23008.942	$5716°_{3\,1/2} - 28725_{4\,1/2}$	10	4357.313	2	*MB*	22943.475		
4345.199	15	*MB*	23007.438	$14963°_{5\,1/2} - 37970_{5\,1/2}$	6	4357.598	2	*MB*	22941.974		
4345.449	30	*MB*	23006.114	$7059°_{4\,1/2} - 30065_{3\,1/2}$	22	4357.908	40	*MB*	22940.342	$9198°_{3\,1/2} - 32138_{2\,1/2}$	−29
4345.846	50	*MB*	23004.012	$9634°_{1\,1/2} - 32638_{1\,1/2}$	34	4358.165	2	*MB*	22938.989		
4345.954	110	*MB*	23003.441	$8927°_{5\,1/2} - 31930_{4\,1/2}$	19	4358.319	2	*MB*	22938.179	$18147°_{2\,1/2} - 41085_{3\,1/2}$	−29
4346.429	50	*MB*	23000.927	$8169°_{1\,1/2} - 31170_{1\,1/2}$	−19	4358.424	12	*MB*	22937.626	$9778°_{2\,1/2} - 32716_{2\,1/2}$	−34
4346.661	12	*MB*	22999.699	$9198°_{3\,1/2} - 32197_{4\,1/2}$	43	4359.070	70	*MB*	22934.227	$8804°_{4\,1/2} - 31738_{5\,1/2}$	−32
4346.771	5	*MB*	22999.117	$7746°_{2\,1/2} - 30745_{1\,1/2}$	16	4359.362	12	*MB*	22932.691	$10641°_{2\,1/2} - 33574_{1\,1/2}$	−11
4347.588	20	*MB*	22994.795	$8175°_{2\,1/2} - 31170_{1\,1/2}$	13	4359.601	5	*MB*	22931.434		
4347.694	30	*MB*	22994.235	$4910°_{5\,1/2} - 27905_{4\,1/2}$	41	4359.847	2	*MB*	22930.140	$10114°_{2\,1/2} - 33045_{2\,1/2}$	−71
4348.019	10	*MB*	22992.516	$11340°_{3\,1/2} - 34333_{2\,1/2}$	16	4359.931	17	*MB*	22929.698	$12097_{3\,1/2} - 35026°_{4\,1/2}$	30
4348.072	2	*MB*	22992.236			4360.059	15	*MB*	22929.025	$2563°_{5\,1/2} - 25492_{5\,1/2}$	7
4348.182	25	*MB*	22991.654	$4523°_{4\,1/2} - 27514_{3\,1/2}$	27	4360.165	70	*MB*	22928.468	$6521°_{1\,1/2} - 29449_{1\,1/2}$	22
4348.326	25	*MB*	22990.893	$12466°_{1\,1/2} - 35457_{1\,1/2}$	5	4360.414	20	*MB*	22927.158	$7818°_{1\,1/2} - 30745_{1\,1/2}$	19
4348.585	15	*MB*	22989.523	$7713°_{4\,1/2} - 30702_{4\,1/2}$	3	4360.444	30	*MB*	22927.001	$8280°_{2\,1/2} - 31207_{3\,1/2}$	20
4349.103	12	*MB*	22986.785	$7259°_{3\,1/2} - 30245_{4\,1/2}$	−17	4360.619	17	*MB*	22926.080		
4349.399	20	*MB*	22985.221	$11949°_{3\,1/2} - 34934_{2\,1/2}$	−12	4360.879	5	*MB*	22924.714		
4349.788	500	*MB*	22983.165	$5651°_{5\,1/2} - 28634_{5\,1/2}$	7	4361.060	2	*MB*	22923.762		
4350.299	7	*MB*	22980.466	$12365°_{4\,1/2} - 35346_{3\,1/2}$	−9	4361.214	10	*MB*	22922.953		

501-968 O - 73 - 9

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4361.360	25	*MB*	22922.185	$7061°_{0\,1/2}-29984_{1\,1/2}$	−28	4376.685	1	*MB*	22841.924		
4361.650	90	*MB*	22920.661	$4266°_{3\,1/2}-27187_{3\,1/2}$	11	4376.866	4	*MB*	22840.980	$7293°_{6\,1/2}-30134_{5\,1/2}$	8
4361.937	10	*MB*	22919.153			4378.546	1	*MB*	22832.216	$8402°_{3\,1/2}-31234_{2\,1/2}$	5
4362.431	17	*MB*	22916.558	$14315°_{0\,1/2}-37232_{1\,1/2}$	52	4379.069	5	*MB*	22829.489	$11325°_{2\,1/2}-34155_{3\,1/2}$	−40
4362.642	10	*MB*	22915.450			4380.057	80	*MB*	22824.340	$5010°_{2\,1/2}-27835_{1\,1/2}$	−22
4362.999	7	*MB*	22913.574	$13012°_{2\,1/2}-35925_{3\,1/2}$	−12	4380.314	4	*MB*	22823.001	$9491°_{0\,1/2}-32314_{0\,1/2}$	25
4363.082	17	*MB*	22913.139	$9053_{3\,1/2}-31966°_{2\,1/2}$	20	4381.079	5	*MB*	22819.016	$7818°_{1\,1/2}-30637_{2\,1/2}$	6
4363.194	7	*MB*	22912.551			4381.774	80	*MB*	22815.396	$5819°_{4\,1/2}-28634_{5\,1/2}$	−6
4363.376	25	*MB*	22911.595	$5819°_{4\,1/2}-28730_{3\,1/2}$	−3	4382.164	650	*MB*	22813.366	$5513_{5\,1/2}-28327°_{5\,1/2}$	4
4363.460	16	*MB*	22911.154	$10641°_{2\,1/2}-33552_{2\,1/2}$	14	4382.624	1	*MB*	22810.971	$8927°_{5\,1/2}-31738_{5\,1/2}$	1
4363.771	2	*MB*	22909.521			4383.562	10	*MB*	22806.090	$7259°_{3\,1/2}-30065_{3\,1/2}$	1
4364.111	25	*MB*	22907.736	$11387°_{3\,1/2}-34295_{4\,1/2}$	17	4383.723	7	*MB*	22805.253	$8402°_{3\,1/2}-31207_{3\,1/2}$	−5
4364.434	17	*MB*	22906.041	$5819°_{4\,1/2}-28725_{4\,1/2}$	6	4383.866	9	*MB*	22804.509	$10274°_{3\,1/2}-33079_{3\,1/2}$	−31
4364.650	650	*MB*	22904.907	$3995°_{3\,1/2}-26900_{3\,1/2}$	13	4383.986	1	*MB*	22803.884		
4364.923	5	*MB*	22903.475			4384.438	4	*MB*	22801.534	$5010°_{2\,1/2}-27812_{2\,1/2}$	6
4365.128	12	*MB*	22902.399			4384.533	1	*MB*	22801.040		
4365.339	20	*MB*	22901.292	$7233°_{5\,1/2}-30134_{5\,1/2}$	9	4384.627	1	*MB*	22800.551	$6638°_{4\,1/2}-29438_{5\,1/2}$	−7
4365.511	20	*MB*	22900.390	$5437°_{3\,1/2}-28337_{2\,1/2}$	−1	4384.768	2	*MB*	22799.818		
4365.697	17	*MB*	22899.414			4385.311	3	*MB*	22796.995	$10314_{4\,1/2}-33111°_{3\,1/2}$	−5
4366.095	17	*MB*	22897.327	$5437°_{3\,1/2}-28334_{4\,1/2}$	−6	4385.483	3	*MB*	22796.101	$12762°_{4\,1/2}-35558_{3\,1/2}$	40
4366.506	20	*MB*	22895.172	$19138°_{1\,1/2}-42033_{2\,1/2}$	51	4385.645	1	*MB*	22795.258	$29263°_{5\,1/2}-52058_{4\,1/2}$	10
4366.993	70	*MB*	22892.618	$11015_{3\,1/2}-33908°_{4\,1/2}$	5	4386.304	5	*MB*	22791.834	$8169°_{1\,1/2}-30961_{1\,1/2}$	14
4367.304	25	*MB*	22890.988	$25766°_{4\,1/2}-48657_{3\,1/2}$	7	4386.367	50	*MB*	22791.506	$7202°_{2\,1/2}-29994_{2\,1/2}$	−5
				$7746°_{2\,1/2}-30637_{2\,1/2}$	16	4386.697	120	*MB*	22789.792	$4459°_{3\,1/2}-27249_{2\,1/2}$	−4
4367.547	50	*MB*	22889.715	$10684°_{0\,1/2}-33574_{1\,1/2}$	11	4386.826	500	*MB*	22789.122	$1873°_{3\,1/2}-24663_{4\,1/2}$	1
				$8280°_{2\,1/2}-31170_{1\,1/2}$	16						
						4387.057	8	*MB*	22787.922	$5942°_{3\,1/2}-28730_{3\,1/2}$	8
4367.804	15	*MB*	22888.368			4387.491	4	*MB*	22785.668	$8175°_{2\,1/2}-30961_{1\,1/2}$	13
4368.225	60	*MB*	22886.162	$7293°_{6\,1/2}-30180_{6\,1/2}$	4	4388.003	220	*MB*	22783.009	$6967_{6\,1/2}-29750°_{5\,1/2}$	9
4369.234	50	*MB*	22880.877	$7011_{4\,1/2}-29892°_{3\,1/2}$	4	4388.288	3	*MB*	22781.529	$7202°_{2\,1/2}-29984_{1\,1/2}$	7
4369.422	12	*MB*	22879.892			4388.751	1	*MB*	22779.126	$19950_{6\,1/2}-42729°_{5\,1/2}$	20
4369.715	7	*MB*	22878.358			4389.100	4	*MB*	22777.315	$4737°_{2\,1/2}-27514_{3\,1/2}$	28
4370.496	2	*MB*	22874.270			4389.457	1	*MB*	22775.463	$28396°_{2\,1/2}-51171_{3\,1/2}$	32
4370.630	17	*MB*	22873.569	$10274°_{3\,1/2}-33148_{2\,1/2}$	−48	4389.798	4	*MB*	22773.693	$10820_{2\,1/2}-33594°_{2\,1/2}$	28
4370.684	15	*MB*	22873.286	$9634°_{1\,1/2}-32507_{1\,1/2}$	30	4389.987	2	*MB*	22772.713		
4371.342	7	*MB*	22869.843			4390.276	120	*MB*	22771.214	$11742°_{5\,1/2}-34513_{6\,1/2}$	−8
4371.585	5	*MB*	22868.572	$11007°_{1\,1/2}-33876_{1\,1/2}$	−5	4390.482	5	*MB*	22770.145	$10274°_{3\,1/2}-33045_{2\,1/2}$	22
4371.844	17	*MB*	22867.217	$8175°_{2\,1/2}-31043_{2\,1/2}$	−29	4390.761	1	*MB*	22768.699	$9723°_{4\,1/2}-32492_{5\,1/2}$	−3
4372.392	70	*MB*	22864.351	$4322°_{2\,1/2}-27187_{3\,1/2}$	13	4390.805	4	*MB*	22768.470	$10641°_{2\,1/2}-33409_{3\,1/2}$	16
4372.450	10	*MB*	22864.048	$11949°_{3\,1/2}-34813_{2\,1/2}$	35	4391.187	2	*MB*	22766.490	$10035°_{5\,1/2}-32802_{5\,1/2}$	36
4372.672	15	*MB*	22862.887	$8169°_{1\,1/2}-31032_{0\,1/2}$	−25	4391.319	5	*MB*	22765.806	$5964°_{3\,1/2}-28730_{3\,1/2}$	−9
4372.708	12	*MB*	22862.699	$7202°_{2\,1/2}-30065_{3\,1/2}$	64	4391.660	1200	*MB*	22764.038	$2595°_{1\,1/2}-25359_{2\,1/2}$	−3
4372.879	2	*MB*	22861.805			4392.010	15	*MB*	22762.224	$8280°_{2\,1/2}-31043_{2\,1/2}$	60
4373.214	35b	*MB*	22860.054	$5437°_{3\,1/2}-28297_{3\,1/2}$	3	4392.401	5	*MB*	22760.197	$5964°_{3\,1/2}-28725_{4\,1/2}$	−54
4373.819	250	*MB*	22856.892	$4523°_{4\,1/2}-27379_{5\,1/2}$	−23	4392.425	2	*MB*	22760.073	$6521°_{1\,1/2}-29281_{2\,1/2}$	31
4374.934	2	*MB*	22851.066			4392.665	4	*MB*	22758.830	$7878°_{3\,1/2}-30637_{2\,1/2}$	1
4375.169	35	*MB*	22849.839	$7059°_{4\,1/2}-29908_{4\,1/2}$	7	4393.181	110	*MB*	22756.157	$5969°_{5\,1/2}-28725_{4\,1/2}$	16
4375.688	2	*MB*	22847.129	$6517°_{2\,1/2}-29364_{3\,1/2}$	8	4393.512	4	*MB*	22754.442	$8804°_{4\,1/2}-31558_{3\,1/2}$	40
4375.920	380	*MB*	22845.918	$3995°_{3\,1/2}-26841_{4\,1/2}$	−5	4394.271	4	*MB*	22750.512	$14481°_{2\,1/2}-37232_{1\,1/2}$	4
4376.073	1	*MB*	22845.119			4394.772	60	*MB*	22747.919	$10114°_{2\,1/2}-32862_{3\,1/2}$	35
4376.533	1	*MB*	22842.718			4395.351	2	*MB*	22744.922		

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4396.432	3	MB	22739.329	$9198°_{3\frac{1}{2}} - 31937_{3\frac{1}{2}}$	3
4396.556	50	MB	22738.688	$7011_{4\frac{1}{2}} - 29750°_{5\frac{1}{2}}$	−54
4396.609	5	MB	22738.414	$4511°_{2\frac{1}{2}} - 27249_{2\frac{1}{2}}$	2
4396.929	1	MB	22736.759		
4397.183	4	MB	22735.446	$7059°_{4\frac{1}{2}} - 29794_{3\frac{1}{2}}$	1
4397.275	6	MB	22734.970	$7259°_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	4
4397.686	5	MB	22732.846	$5616_{4\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	3
4397.853	5	MB	22731.982	$13784°_{1\frac{1}{2}} - 36516_{1\frac{1}{2}}$	19
4397.974	5	MB	22731.357	$12466°_{1\frac{1}{2}} - 35197_{1\frac{1}{2}}$	−52
4398.537	5	MB	22728.447	$9778°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−8
				$7061°_{0\frac{1}{2}} - 29790_{0\frac{1}{2}}$	16
4398.782	140	MB	22727.182	$4459°_{3\frac{1}{2}} - 27187_{3\frac{1}{2}}$	7
4399.198	360	MB	22725.032	$2634°_{2\frac{1}{2}} - 25359_{2\frac{1}{2}}$	13
4399.541	6	MB	22723.261	$7522°_{5\frac{1}{2}} - 30245_{4\frac{1}{2}}$	5
4400.145	8	MB	22720.141	$2641°_{3\frac{1}{2}} - 25361_{4\frac{1}{2}}$	27
4400.535	50	MB	22718.128	$2641°_{3\frac{1}{2}} - 25359_{2\frac{1}{2}}$	1
4400.864	50	MB	22716.430	$5118°_{2\frac{1}{2}} - 27835_{1\frac{1}{2}}$	3
4401.157	3	MB	22714.917		
4401.431	9	MB	22713.504		
4401.772	1	MB	22711.744		
4401.993	5	MB	22710.604	$12057°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	20
4402.203	1	MB	22709.520		
4402.265	1	MB	22709.200		
4402.572	1	WA	22707.617	$18393_{3\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	12
4403.299	40	MB	22703.868	$11340°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	25
4403.557	4	MB	22702.538	$16133_{2\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	−1
4404.057	3	MB	22699.960		
4405.151	5	MB	22694.323	$10454°_{1\frac{1}{2}} - 33148_{2\frac{1}{2}}$	6
4405.292	8	MB	22693.597	$5118°_{2\frac{1}{2}} - 27812_{2\frac{1}{2}}$	5
4405.466	50	MB	22692.700	$5118°_{2\frac{1}{2}} - 27811_{3\frac{1}{2}}$	10
4405.982	2	MB	22690.043	$9723°_{4\frac{1}{2}} - 32413_{3\frac{1}{2}}$	32
4407.274	120	MB	22683.391	$5651°_{5\frac{1}{2}} - 28334_{4\frac{1}{2}}$	−7
4407.818	4	MB	22680.592	$8280°_{2\frac{1}{2}} - 30961_{1\frac{1}{2}}$	20
4408.095	1	MB	22679.167	$7746°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	3
4408.501	1	MB	22677.078		
4408.752	5	MB	22675.787	$4511°_{2\frac{1}{2}} - 27187_{3\frac{1}{2}}$	−2
4408.854	45	MB	22675.262	$7233°_{5\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−14
4408.903	24	MB	22675.010	$10314_{4\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	−45
4409.034	4	MB	22674.337	$12260°_{3\frac{1}{2}} - 34934_{2\frac{1}{2}}$	2
4409.306	3	MB	22672.938	$8402°_{3\frac{1}{2}} - 31075_{4\frac{1}{2}}$	3
4409.710	1	MB	22670.861		
4410.109	1	MB	22668.810	$12260°_{3\frac{1}{2}} - 34928_{4\frac{1}{2}}$	−70
4410.527	4	MB	22666.661	$8702°_{1\frac{1}{2}} - 31369_{2\frac{1}{2}}$	13
4410.637	250	MB	22666.096	$10869_{4\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	1
4410.758	250	MB	22665.474	$7454_{1\frac{1}{2}} - 30120°_{1\frac{1}{2}}$	19
4411.036	1	MB	22664.046	$4523°_{4\frac{1}{2}} - 27187_{3\frac{1}{2}}$	32
4411.681	8	MB	22660.732	$12260°_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	33
4412.017	90	MB	22659.007	$5675°_{4\frac{1}{2}} - 28334_{4\frac{1}{2}}$	14
4412.311	4	MB	22657.497	$7522°_{5\frac{1}{2}} - 30180_{6\frac{1}{2}}$	23
4412.466	1	MB	22656.701	$11387°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−8
4412.506	1	MB	22656.496		
4413.131	2	MB	22653.287	$8175°_{2\frac{1}{2}} - 30829_{3\frac{1}{2}}$	26
4413.193	80	MB	22652.969	$987°_{4\frac{1}{2}} - 23640_{4\frac{1}{2}}$	17
4413.799	50	MB	22649.858	$9316_{3\frac{1}{2}} - 31966°_{2\frac{1}{2}}$	23
				$7259°_{3\frac{1}{2}} - 29908_{4\frac{1}{2}}$	30
4415.620	5	MB	22640.518	$8927°_{5\frac{1}{2}} - 31568_{4\frac{1}{2}}$	13
4416.397	1	MB	22636.535	$11340°_{3\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−6
4416.811	5	MB	22634.413	$9778°_{2\frac{1}{2}} - 32413_{3\frac{1}{2}}$	53
4416.899	220	MB	22633.962	$4266°_{3\frac{1}{2}} - 26900_{3\frac{1}{2}}$	5
4417.899	1	MB	22628.839		
4418.058	2	MB	22628.025	$10088°_{1\frac{1}{2}} - 32716_{2\frac{1}{2}}$	18
4418.291	3	MB	22626.831	$1873°_{3\frac{1}{2}} - 24500_{2\frac{1}{2}}$	9
4418.778	700	MB	22624.337	$6967_{6\frac{1}{2}} - 29591°_{6\frac{1}{2}}$	12
4419.047	1	MB	22622.960		
4419.297	50	MB	22621.681	$5675°_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−28
4419.552	1	MB	22620.375		
4419.645	1	MB	22619.899	$15517°_{6\frac{1}{2}} - 38137_{5\frac{1}{2}}$	−10
4419.681	4	MB	22619.715		
4419.907	2	MB	22618.559	$5716°_{3\frac{1}{2}} - 28334_{4\frac{1}{2}}$	19
4420.733	1	MB	22614.333		
4421.139	4	MB	22612.256	$7522°_{5\frac{1}{2}} - 30134_{5\frac{1}{2}}$	−32
				$19136°_{2\frac{1}{2}} - 41748_{1\frac{1}{2}}$	1
4421.315	2	MB	22611.356	$10798°_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	14
4421.710	4	MB	22609.336		
4422.137	4	MB	22607.152	$7818°_{1\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−49
4422.650	2	MB	22604.530	$7202°_{2\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−18
4423.186	1	MB	22601.791	$10114°_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	28
4423.674	140	MB	22599.298	$8531_{3\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	−6
4424.130	4	MB	22596.969	$14481°_{2\frac{1}{2}} - 37078_{1\frac{1}{2}}$	20
4424.312	5	MB	22596.039	$10454°_{1\frac{1}{2}} - 33050_{1\frac{1}{2}}$	20
4424.478	1	MB	22595.191		
4424.545	3	MB	22594.849	$9723°_{4\frac{1}{2}} - 32318_{3\frac{1}{2}}$	9
4425.101	3	MB	22592.010	$7202°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	22
4425.322	5	MB	22590.882	$10454°_{1\frac{1}{2}} - 33045_{2\frac{1}{2}}$	59
4427.067	220	MB	22581.978	$3363°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	9
4427.205	5	MB	22581.274	$5716°_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	17
4427.733	4	MB	22578.581	$11015_{3\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	8
4427.915	340	MB	22577.653	$4322°_{2\frac{1}{2}} - 26900_{3\frac{1}{2}}$	7
4428.202	8	MB	22576.190	$0°_{3\frac{1}{2}} - 22576_{2\frac{1}{2}}$	20
4428.434	220	MB	22575.007	$4266°_{3\frac{1}{2}} - 26841_{4\frac{1}{2}}$	20
4428.669	5	MB	22573.809		
4429.265	460	MB	22570.772	$8774_{4\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	8
4429.450	3	MB	22569.829		
4429.522	3	MB	22569.462	$8175°_{2\frac{1}{2}} - 30745_{1\frac{1}{2}}$	39
4429.989	50	MB	22567.083	$16268_{1\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	22
4430.127	2	MB	22566.380	$11007°_{1\frac{1}{2}} - 33574_{1\frac{1}{2}}$	34
4430.363	4	MB	22565.178		
4430.469	1	MB	22564.638		
4430.754	1	MB	22563.187	$12365°_{4\frac{1}{2}} - 34928_{4\frac{1}{2}}$	24
4431.019	4	MB	22561.837		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4432.279	3	*WA*	22555.424	$8789_{2\,1/2} - 31344°_{3\,1/2}$	−23	4452.504	4	*MB*	22452.970	$7713°_{4\,1/2} - 30166_{3\,1/2}$	2
4432.360	1	*MB*	22555.011	$12365°_{4\,1/2} - 34920_{3\,1/2}$	30	4452.552	40	*MB*	22452.728	$15517°_{6\,1/2} - 37970_{5\,1/2}$	−31
4432.717	40	*MB*	22553.195	$11742°_{5\,1/2} - 34295_{4\,1/2}$	−9					$13659°_{4\,1/2} - 36112_{3\,1/2}$	36
4432.911	50	*MB*	22552.208	$5283°_{0\,1/2} - 27835_{1\,1/2}$	4	4453.156	40	*MB*	22449.682	$4737°_{2\,1/2} - 27187_{3\,1/2}$	9
4433.224	2	*MB*	22550.616	$11325°_{2\,1/2} - 33876_{1\,1/2}$	20	4454.040	3	*MB*	22445.227	$13012°_{2\,1/2} - 35457_{1\,1/2}$	4
4433.328	1	*MB*	22550.087	$10314_{4\,1/2} - 32864°_{5\,1/2}$	−28	4454.983	60	*MB*	22440.476	$4459°_{3\,1/2} - 26900_{3\,1/2}$	−5
4433.700	18	*MB*	22548.195	$8280°_{2\,1/2} - 30829_{3\,1/2}$	17	4455.455	2	*MB*	22438.099	$10641°_{2\,1/2} - 33079_{3\,1/2}$	29
4433.736	18	*MB*	22548.011	$7259°_{3\,1/2} - 29807_{3\,1/2}$	9	4455.650	60	*MB*	22437.117	$2382°_{4\,1/2} - 24819_{3\,1/2}$	29
4434.372	3	*WA*	22544.778	$11007°_{1\,1/2} - 33552_{2\,1/2}$	−4	4455.870	4	*MB*	22436.009		
4434.671	1	*MB*	22543.257	$13659°_{4\,1/2} - 36202_{4\,1/2}$	30	4457.766	30	*MB*	22426.466	$8402°_{3\,1/2} - 30829_{3\,1/2}$	11
4434.952	4	*WA*	22541.829			4458.288	1	*MB*	22423.841	$11387°_{3\,1/2} - 33811_{4\,1/2}$	5
4435.468	2	*MB*	22539.207	$9778°_{2\,1/2} - 32318_{3\,1/2}$	18	4458.829	4	*MB*	22421.120	$5924°_{1\,1/2} - 28345_{0\,1/2}$	8
4435.599	4	*MB*	22538.541	$8131_{4\,1/2} - 30669°_{4\,1/2}$	57	4459.073	4	*MB*	22419.893	$7746°_{2\,1/2} - 30166_{3\,1/2}$	21
4436.061	6	*MB*	22536.194			4459.328	1	*MB*	22418.611		
4436.206	7	*MB*	22535.457	$7259°_{3\,1/2} - 29794_{3\,1/2}$	16	4459.778	9	*MB*	22416.349		
4436.737	2	*WA*	22532.760	$7713°_{4\,1/2} - 30245_{4\,1/2}$	−28	4460.204	1700	*MB*	22414.208	$3854_{3\,1/2} - 26268°_{3\,1/2}$	17
4437.298	4	*MB*	22529.912	$13758°_{1\,1/2} - 36288_{0\,1/2}$	−76	4461.131	320	*MB*	22409.551	$7341_{5\,1/2} - 29750°_{5\,1/2}$	11
4437.608	80	*MB*	22528.338	$16133_{2\,1/2} - 38661°_{1\,1/2}$	12	4461.366	1	*MB*	22408.370	$15565°_{2\,1/2} - 37973_{3\,1/2}$	15
				$6638°_{4\,1/2} - 29166_{4\,1/2}$	0	4461.820	1	*MB*	22406.090	$10454°_{1\,1/2} - 32860_{0\,1/2}$	9
4438.184	3	*WA*	22525.414	$6913°_{6\,1/2} - 29438_{5\,1/2}$	−10	4462.030	3	*MB*	22405.036	$4844°_{1\,1/2} - 27249_{2\,1/2}$	11
4439.240	60	*MB*	22520.056	$11015_{3\,1/2} - 33535°_{3\,1/2}$	0	4462.295	4	*MB*	22403.705	$8804°_{4\,1/2} - 31207_{3\,1/2}$	2
4440.112	4	*MB*	22515.633	$5819°_{4\,1/2} - 28334_{4\,1/2}$	−9	4463.406	300	*MB*	22398.129	$7722_{2\,1/2} - 30120°_{1\,1/2}$	8
4440.879	90	*MB*	22511.745	$6517°_{2\,1/2} - 29029_{1\,1/2}$	11	4463.855	6	*MB*	22395.876	$5118°_{2\,1/2} - 27514_{3\,1/2}$	22
4441.329	2	*WA*	22509.464	$9725_{3\,1/2} - 32235°_{3\,1/2}$	−41	4464.170	40	*MB*	22394.296	$10646_{5\,1/2} - 33040°_{4\,1/2}$	13
4441.615	5	*MB*	22508.014	$6521°_{1\,1/2} - 29029_{1\,1/2}$	−6	4464.453	1	*WA*	22392.876	$16268_{1\,1/2} - 38661°_{1\,1/2}$	29
4441.789	1	*MB*	22507.132	$10641°_{2\,1/2} - 33148_{2\,1/2}$	−14	4464.698	100	*MB*	22391.647	$8278_{5\,1/2} - 30669°_{4\,1/2}$	0
4442.345	2	*MB*	22504.316			4465.208	2	*MB*	22389.090	$4511°_{2\,1/2} - 26900_{3\,1/2}$	−6
4442.395	2	*MB*	22504.062			4465.434	30	*MB*	22387.956	$7061°_{0\,1/2} - 29449_{1\,1/2}$	17
4443.289	2	*MB*	22499.534	$17976_{2\,1/2} - 40475°_{3\,1/2}$	23	4465.778	2	*MB*	22386.232	$7522°_{5\,1/2} - 29908_{4\,1/2}$	−49
4443.748	110	*MB*	22497.211	$5437°_{3\,1/2} - 27934_{4\,1/2}$	−4	4466.240	1	*MB*	22383.916	$11949°_{3\,1/2} - 34333_{2\,1/2}$	8
4443.926	1	*MB*	22496.310	$9269°_{0\,1/2} - 31766_{1\,1/2}$	27	4466.555	1	*MB*	22382.338	$16159°_{3\,1/2} - 38541_{4\,1/2}$	1
4444.388	340	*MB*	22493.971	$7454_{1\,1/2} - 29948°_{2\,1/2}$	8	4466.785	3	*MB*	22381.185	$16454_{2\,1/2} - 38835°_{2\,1/2}$	7
4444.697	320	*MB*	22492.407	$8531_{3\,1/2} - 31024°_{2\,1/2}$	9	4467.073	5	*MB*	22379.742	$7059°_{4\,1/2} - 29438_{5\,1/2}$	−2
4445.569	2	*MB*	22487.995			4467.555	200	*MB*	22377.328	$4523°_{4\,1/2} - 26900_{3\,1/2}$	7
4446.151	40	*MB*	22485.052	$10924°_{4\,1/2} - 33409_{3\,1/2}$	31	4468.025	3	*MB*	22374.974	$5437°_{3\,1/2} - 27812_{2\,1/2}$	−1
4446.639	3	*MT*	22482.584	$11325°_{2\,1/2} - 33808_{2\,1/2}$	48	4468.433	1	*MB*	22372.931	$5964°_{3\,1/2} - 28337_{2\,1/2}$	13
4446.764	1	*MB*	22481.952	$2879°_{5\,1/2} - 25361_{4\,1/2}$	−26	4468.629	3	*MB*	22371.950	$10924°_{4\,1/2} - 33296_{4\,1/2}$	21
4447.128	6	*MB*	22480.112			4469.048	1	*WA*	22369.852	$5964°_{3\,1/2} - 28334_{4\,1/2}$	−7
4447.256	1	*MB*	22479.465	$6549°_{2\,1/2} - 29029_{1\,1/2}$	20	4469.124	3	*MB*	22369.472	$16159°_{3\,1/2} - 38529_{2\,1/2}$	−12
4447.466	1	*MB*	22478.404	$5819°_{4\,1/2} - 28297_{3\,1/2}$	44	4469.226	2	*MB*	22368.961	$12057°_{2\,1/2} - 34426_{2\,1/2}$	32
4448.237	3	*MB*	22474.508			4469.508	2	*MB*	22367.550	$7878°_{3\,1/2} - 30245_{4\,1/2}$	0
4448.327	2	*MB*	22474.053			4469.847	3	*MB*	22365.854	$10684°_{0\,1/2} - 33050_{1\,1/2}$	4
4448.934	1	*MB*	22470.986	$11340°_{3\,1/2} - 33811_{4\,1/2}$	18	4470.201	1	*WA*	22364.083	$18147°_{2\,1/2} - 40511_{1\,1/2}$	−38
4449.322	550	*MB*	22469.027	$4910°_{5\,1/2} - 27379_{5\,1/2}$	41	4470.544	1	*MB*	22362.367	$14481°_{2\,1/2} - 36844_{2\,1/2}$	−7
4449.573	5	*MB*	22467.760	$5437°_{3\,1/2} - 27905_{4\,1/2}$	25	4471.237	1000	*MB*	22358.901	$5616_{4\,1/2} - 27975°_{4\,1/2}$	21
4449.631	70	*MB*	22467.467	$8169°_{1\,1/2} - 30637_{2\,1/2}$	8	4471.632	4	*MB*	22356.926	$8774_{4\,1/2} - 31130°_{3\,1/2}$	7
4450.115	2	*MB*	22465.023			4471.779	1	*WA*	22356.191	$8280°_{2\,1/2} - 30637_{2\,1/2}$	−19
4450.250	2	*MB*	22464.342	$8280°_{2\,1/2} - 30745_{1\,1/2}$	2	4472.083	4	*MB*	22354.671	$5942°_{3\,1/2} - 28297_{3\,1/2}$	−3
4450.727	440	*MB*	22461.934	$5513_{5\,1/2} - 27975°_{4\,1/2}$	24	4472.600	10	*MB*	22352.087	$7713°_{4\,1/2} - 30065_{3\,1/2}$	13
4452.072	2	*MB*	22455.148			4472.714	320	*MB*	22351.518	$3593°_{4\,1/2} - 25945_{3\,1/2}$	4

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4473.132	2	*MB*	22349.429	$16192^{\circ}_{4\,1/2} - 38541_{4\,1/2}$	22	4496.254	50	*MB*	22234.499	$8402^{\circ}_{3\,1/2} - 30637_{2\,1/2}$	10
4473.378	2	*MB*	22348.200			4496.549	1	*MB*	22233.040	$14963^{\circ}_{5\,1/2} - 37196_{4\,1/2}$	1
4473.605	4	*MB*	22347.066			4497.120	1	*MB*	22230.217	$1410^{\circ}_{4\,1/2} - 23640_{4\,1/2}$	−41
4473.762	1	*MB*	22346.282	$11949^{\circ}_{3\,1/2} - 34295_{4\,1/2}$	21	4497.295	2	*MB*	22229.352	$5675^{\circ}_{4\,1/2} - 27905_{4\,1/2}$	−41
4474.331	1	*MB*	22343.440			4497.544	2	*MB*	22228.121	$8927^{\circ}_{5\,1/2} - 31155_{6\,1/2}$	13
4474.698	30	*MB*	22341.607	$8789_{2\,1/2} - 31130^{\circ}_{3\,1/2}$	5	4497.847	180	*MB*	22226.624	$7722_{2\,1/2} - 29948^{\circ}_{2\,1/2}$	−4
4474.865	3	*WA*	22340.774	$6389^{\circ}_{4\,1/2} - 28730_{3\,1/2}$	4	4497.992	2	*WA*	22225.908	$10088^{\circ}_{1\,1/2} - 32314_{0\,1/2}$	82
4475.974	2	*WA*	22335.238	$6389^{\circ}_{4\,1/2} - 28725_{4\,1/2}$	33	4498.917	1	*MB*	22221.338	$10641^{\circ}_{2\,1/2} - 32862_{3\,1/2}$	13
4476.497	5	*MB*	22332.629	$5964^{\circ}_{3\,1/2} - 28297_{3\,1/2}$	52	4499.505	5	*MB*	22218.434	$5716^{\circ}_{3\,1/2} - 27934_{4\,1/2}$	12
4476.990	2	*MB*	22330.170	$8702^{\circ}_{1\,1/2} - 31032_{0\,1/2}$	3	4499.753	9	*MB*	22217.210	$9634^{\circ}_{1\,1/2} - 31851_{2\,1/2}$	0
4477.212	4	*MB*	22329.063			4500.333	60	*MB*	22214.346	$9723^{\circ}_{4\,1/2} - 31937_{3\,1/2}$	28
4478.396	1	*WA*	22323.159	$29735^{\circ}_{4\,1/2} - 52058_{4\,1/2}$	−14	4500.487	2	*MB*	22213.586	$13012^{\circ}_{2\,1/2} - 35225_{2\,1/2}$	25
4479.085	3	*MB*	22319.725			4500.809	3	*MB*	22211.997	$11340^{\circ}_{3\,1/2} - 33552_{2\,1/2}$	13
4479.229	10	*MB*	22319.008	$7746^{\circ}_{2\,1/2} - 30065_{3\,1/2}$	29	4501.694	3	*MB*	22207.630	$9723^{\circ}_{4\,1/2} - 31930_{4\,1/2}$	30
4479.358	500	*MB*	22318.365	$4523^{\circ}_{4\,1/2} - 26841_{4\,1/2}$	15	4501.829	4	*MB*	22206.964	$16454_{2\,1/2} - 38661^{\circ}_{1\,1/2}$	0
4479.418	15	*MB*	22318.066	$3363^{\circ}_{2\,1/2} - 25681_{1\,1/2}$	6	4501.996	2	*WA*	22206.141	$11949^{\circ}_{3\,1/2} - 34155_{3\,1/2}$	19
4481.263	1	*MB*	22308.878			4502.568	4	*MB*	22203.320	$10114^{\circ}_{2\,1/2} - 32318_{3\,1/2}$	28
4481.478	4	*MB*	22307.808			4502.833	1	*MB*	22202.013		
4481.906	5	*MB*	22305.677	$7059^{\circ}_{4\,1/2} - 29364_{3\,1/2}$	9	4504.395	3	*MB*	22194.314		
4482.603	3	*MB*	22302.209	$11742^{\circ}_{5\,1/2} - 34044_{4\,1/2}$	13	4504.702	1	*MB*	22192.802		
4482.671	2	*MB*	22301.871	$10314_{4\,1/2} - 32616^{\circ}_{4\,1/2}$	14	4505.486	2	*WA*	22188.940	$5716^{\circ}_{3\,1/2} - 27905_{4\,1/2}$	0
4482.787	3	*MB*	22301.294	$12466^{\circ}_{1\,1/2} - 34767_{1\,1/2}$	33	4505.868	7	*MB*	22187.059	$12326^{\circ}_{6\,1/2} - 34513_{6\,1/2}$	8
4483.054	3	*MB*	22299.965	$8402^{\circ}_{3\,1/2} - 30702_{4\,1/2}$	24	4506.136	3	*MB*	22185.739	$13012^{\circ}_{2\,1/2} - 35197_{1\,1/2}$	−5
4483.350	10	*MB*	22298.493	$10114^{\circ}_{2\,1/2} - 32413_{3\,1/2}$	30	4506.516	2	*WA*	22183.868	$10454^{\circ}_{1\,1/2} - 32638_{1\,1/2}$	−24
4483.891	500	*MB*	22295.803	$6967_{6\,1/2} - 29263^{\circ}_{5\,1/2}$	12	4507.751	8	*MB*	22177.791	$2641^{\circ}_{3\,1/2} - 24819_{3\,1/2}$	16
4484.824	120b	*MB*	22291.165	$9053_{3\,1/2} - 31344^{\circ}_{3\,1/2}$	−33	4508.076	50	*MB*	22176.192	$5010^{\circ}_{2\,1/2} - 27187_{3\,1/2}$	15
4485.280	1	*MB*	22288.898			4508.339	4	*MB*	22174.898	$20554_{5\,1/2} - 42729^{\circ}_{5\,1/2}$	47
4485.512	60	*MB*	22287.745	$7878^{\circ}_{3\,1/2} - 30166_{3\,1/2}$	17	4508.726	10	*MB*	22172.995	$3508^{\circ}_{0\,1/2} - 25681_{1\,1/2}$	−22
4485.872	1	*WA*	22285.957	$10703_{4\,1/2} - 32989^{\circ}_{3\,1/2}$	44	4509.117	25	*MB*	22171.072	$7092_{5\,1/2} - 29263^{\circ}_{5\,1/2}$	0
4486.178	1	*MB*	22284.437			4509.169	20	*MB*	22170.817	$10869_{4\,1/2} - 33040^{\circ}_{4\,1/2}$	5
4486.404	2	*WA*	22283.314	$5651^{\circ}_{5\,1/2} - 27934_{4\,1/2}$	34	4509.254	16	*MB*	22170.399	$7722_{2\,1/2} - 29892^{\circ}_{3\,1/2}$	7
4486.905	600	*MB*	22280.826	$2382^{\circ}_{4\,1/2} - 24663_{4\,1/2}$	18	4509.594	1	*MB*	22168.727	$10820_{2\,1/2} - 32989^{\circ}_{3\,1/2}$	−4
4487.162	4	*MB*	22279.550	$1873^{\circ}_{3\,1/2} - 24153_{3\,1/2}$	18	4509.728	9	*MB*	22168.069	$6517^{\circ}_{2\,1/2} - 28685_{2\,1/2}$	−69
4487.872	1	*MB*	22276.025	$12057^{\circ}_{2\,1/2} - 34333_{2\,1/2}$	35	4510.082	2	*WA*	22166.329	$12762^{\circ}_{4\,1/2} - 34928_{4\,1/2}$	1
4488.809	30	*MB*	22271.375	$8804^{\circ}_{4\,1/2} - 31075_{4\,1/2}$	−3	4510.163	40	*MB*	22165.930	$29892^{\circ}_{3\,1/2} - 52058_{4\,1/2}$	21
										$12260^{\circ}_{3\,1/2} - 34426_{2\,1/2}$	−18
4489.526	6	*MB*	22267.819	$7522^{\circ}_{0\,1/2} - 29790_{0\,1/2}$	7						
4489.817	1	*MB*	22266.375	$13659^{\circ}_{4\,1/2} - 35925_{3\,1/2}$	23	4510.385	1	*MB*	22164.839	$11387^{\circ}_{3\,1/2} - 33552_{2\,1/2}$	−11
4491.307	1	*MB*	22258.989	$8702^{\circ}_{1\,1/2} - 30961_{1\,1/2}$	−84	4510.764	5	*MB*	22162.977	$4737^{\circ}_{2\,1/2} - 26900_{3\,1/2}$	−3
4491.983	1	*MB*	22255.639	$8169^{\circ}_{1\,1/2} - 30425_{2\,1/2}$	−11	4510.915	35	*MB*	22162.235	$8927^{\circ}_{5\,1/2} - 31089_{5\,1/2}$	19
4492.351	1	*MB*	22253.816	$5651^{\circ}_{5\,1/2} - 27905_{4\,1/2}$	16					$7202^{\circ}_{2\,1/2} - 29364_{3\,1/2}$	25
4492.777	9	*MB*	22251.706	$10798^{\circ}_{2\,1/2} - 33050_{1\,1/2}$	−29	4511.638	60	*MB*	22158.684	$9778^{\circ}_{2\,1/2} - 31937_{3\,1/2}$	17
4492.948	30	*MB*	22250.859	$7341_{5\,1/2} - 29591^{\circ}_{6\,1/2}$	−6	4512.169	3	*MB*	22156.076		
4493.222	6	*MB*	22249.502	$8175^{\circ}_{2\,1/2} - 30425_{2\,1/2}$	17	4512.464	2	*WA*	22154.628	$10924^{\circ}_{4\,1/2} - 33079_{3\,1/2}$	−7
4493.555	2	*WA*	22247.853	$7746^{\circ}_{2\,1/2} - 29994_{2\,1/2}$	−2	4512.843	1	*MB*	22152.767		
4493.678	4	*MB*	22247.245	$7202^{\circ}_{2\,1/2} - 29449_{1\,1/2}$	−3	4513.669	2	*WA*	22148.713	$11759_{5\,1/2} - 33908^{\circ}_{4\,1/2}$	−12
4494.219	100	*MB*	22244.566	$6389^{\circ}_{4\,1/2} - 28634_{5\,1/2}$	−7	4513.807	2	*WA*	22148.036	$8927^{\circ}_{5\,1/2} - 31075_{4\,1/2}$	−52
4494.807	1	*MB*	22241.656	$10869_{4\,1/2} - 33111^{\circ}_{3\,1/2}$	35	4514.450	5	*MB*	22144.882	$7293^{\circ}_{6\,1/2} - 29438_{5\,1/2}$	3
4495.384	90	*MB*	22238.802	$5010^{\circ}_{2\,1/2} - 27249_{2\,1/2}$	3	4514.548	1	*MB*	22144.401	$8280^{\circ}_{2\,1/2} - 30425_{2\,1/2}$	−1
4495.528	5	*MB*	22238.089	$2581^{\circ}_{4\,1/2} - 24819_{3\,1/2}$	13	4514.687	5	*MB*	22143.719		
4496.212	50	*MB*	22234.707	$8789_{2\,1/2} - 31024^{\circ}_{2\,1/2}$	11	4515.284	2	*MB*	22140.791	$11007^{\circ}_{1\,1/2} - 33148_{2\,1/2}$	2

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4515.850	80	*MB*	22138.016	$8531_{3\frac{1}{2}} - 30669^{\circ}_{4\frac{1}{2}}$	−7	4539.419	2	*MB*	22023.076	$15565^{\circ}_{2\frac{1}{2}} - 37588_{3\frac{1}{2}}$	23
4516.290	10	*MB*	22135.860	$6549^{\circ}_{2\frac{1}{2}} - 28685_{2\frac{1}{2}}$	10	4539.584	7	*MB*	22022.276	$7259^{\circ}_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−22
4516.910	4	*MB*	22132.821			4539.745	600	*MB*	22021.495	$2641^{\circ}_{3\frac{1}{2}} - 24663_{4\frac{1}{2}}$	0
4517.120	1	*MB*	22131.792	$5819^{\circ}_{4\frac{1}{2}} - 27950_{5\frac{1}{2}}$	15	4541.054	1	*MB*	22015.147	$9723^{\circ}_{4\frac{1}{2}} - 31738_{5\frac{1}{2}}$	−1
4517.297	3	*MB*	22130.925	$5118^{\circ}_{2\frac{1}{2}} - 27249_{2\frac{1}{2}}$	62	4542.904	3	*MB*	22006.182	$10820_{2\frac{1}{2}} - 32826^{\circ}_{1\frac{1}{2}}$	0
4518.725	4	*MB*	22123.932			4543.674	3	*MB*	22002.452	$7278^{\circ}_{1\frac{1}{2}} - 29281_{2\frac{1}{2}}$	1
4519.104	3	*MB*	22122.076			4544.953	150	*MB*	21996.261	$3363^{\circ}_{2\frac{1}{2}} - 25359_{2\frac{1}{2}}$	2
4519.119	2	*MB*	22122.003							$6638^{\circ}_{4\frac{1}{2}} - 28634_{5\frac{1}{2}}$	3
4519.264	5	*MB*	22121.293			4545.870	25	*MB*	21991.824	$5942^{\circ}_{3\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−15
4519.594	70	*MB*	22119.678	$10869_{4\frac{1}{2}} - 32989^{\circ}_{3\frac{1}{2}}$	1	4546.835	3	*MB*	21987.156	$9778^{\circ}_{2\frac{1}{2}} - 31766_{1\frac{1}{2}}$	34
4520.400	5	*MB*	22115.734	$7878^{\circ}_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	21	4549.383	5	*MB*	21974.842	$16159^{\circ}_{3\frac{1}{2}} - 38134_{4\frac{1}{2}}$	−21
4520.994	8	*MB*	22112.828	$19920^{\circ}_{3\frac{1}{2}} - 42033_{2\frac{1}{2}}$	−13	4549.629	50	*MB*	21973.654	$11015_{3\frac{1}{2}} - 32989^{\circ}_{3\frac{1}{2}}$	15
4521.787	1	*MB*	22108.950	$12057^{\circ}_{2\frac{1}{2}} - 34166_{1\frac{1}{2}}$	18	4549.817	2	*MB*	21972.746	$14315^{\circ}_{0\frac{1}{2}} - 36288_{0\frac{1}{2}}$	19
4522.078	16	*MB*	22107.527	$7059^{\circ}_{4\frac{1}{2}} - 29166_{4\frac{1}{2}}$	3	4549.942	3	*MB*	21972.142	$7818^{\circ}_{1\frac{1}{2}} - 29790_{0\frac{1}{2}}$	20
4522.460	5	*MB*	22105.660	$7259^{\circ}_{3\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−4	4550.293	50	*MB*	21970.448	$9053_{3\frac{1}{2}} - 31024^{\circ}_{2\frac{1}{2}}$	1
4523.077	550	*MB*	22102.645	$4165_{4\frac{1}{2}} - 26268^{\circ}_{3\frac{1}{2}}$	−7	4551.292	180	*MB*	21965.625	$5969^{\circ}_{5\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−5
4523.782	4	*MB*	22099.200			4551.714	2	*MB*	21963.589		
4523.941	1	*WA*	22098.424	$13527_{4\frac{1}{2}} - 35625^{\circ}_{3\frac{1}{2}}$	−36	4552.539	3	*MB*	21959.609	$12466^{\circ}_{1\frac{1}{2}} - 34426_{2\frac{1}{2}}$	2
4524.587	5	*MB*	22095.269	$11949^{\circ}_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	17	4553.757	3	*MB*	21953.735	$10684^{\circ}_{0\frac{1}{2}} - 32638_{1\frac{1}{2}}$	11
				$5716^{\circ}_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−10	4554.545	20	*MB*	21949.937	$3995^{\circ}_{3\frac{1}{2}} - 25945_{3\frac{1}{2}}$	1
4524.852	4	*MB*	22093.974	$7713^{\circ}_{4\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−14	4554.698	2	*MB*	21949.199	$19136^{\circ}_{2\frac{1}{2}} - 41085_{3\frac{1}{2}}$	10
4525.758	1	*MB*	22089.552			4554.735	4	*MB*	21949.021		
4526.003	3	*MB*	22088.356			4555.429	50	*MB*	21945.677	$20783_{5\frac{1}{2}} - 42729^{\circ}_{5\frac{1}{2}}$	23
4526.349	5	*MB*	22086.667	$15565^{\circ}_{2\frac{1}{2}} - 37652_{2\frac{1}{2}}$	−3	4555.609	5	*MB*	21944.810	$6389^{\circ}_{4\frac{1}{2}} - 28334_{4\frac{1}{2}}$	−3
4526.861	4	*MB*	22084.169	$11325^{\circ}_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	54	4556.208	18	*MB*	21941.925	$16192^{\circ}_{4\frac{1}{2}} - 38134_{4\frac{1}{2}}$	−8
4527.349	600	*MB*	22081.789	$2581^{\circ}_{4\frac{1}{2}} - 24663_{4\frac{1}{2}}$	−8	4557.039	5	*MB*	21937.924	$10924^{\circ}_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	33
4527.424	10	*MB*	22081.423	$7713^{\circ}_{4\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−4	4557.404	5	*MB*	21936.167	$5969^{\circ}_{5\frac{1}{2}} - 27905_{4\frac{1}{2}}$	17
4527.957	5	*MB*	22078.824	$7202^{\circ}_{2\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−20	4558.067	3	*MB*	21932.976	$7233^{\circ}_{5\frac{1}{2}} - 29166_{4\frac{1}{2}}$	7
4528.472	600	*MB*	22076.313	$6967_{6\frac{1}{2}} - 29043^{\circ}_{6\frac{1}{2}}$	6	4558.600	50	*MB*	21930.412	$4910^{\circ}_{5\frac{1}{2}} - 26841_{4\frac{1}{2}}$	−8
4528.696	3	*MB*	22075.221	$10641^{\circ}_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	16	4558.903	8	*MB*	21928.954	$20783_{5\frac{1}{2}} - 42712^{\circ}_{6\frac{1}{2}}$	−63
4529.150	1	*MB*	22073.008	$12260^{\circ}_{3\frac{1}{2}} - 34333_{2\frac{1}{2}}$	−1	4559.239	1	*MB*	21927.338	$7522^{\circ}_{0\frac{1}{2}} - 29449_{1\frac{1}{2}}$	19
4529.272	4	*MB*	22072.414	$9778^{\circ}_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	3	4560.283	460	*MB*	21922.319	$7341_{5\frac{1}{2}} - 29263^{\circ}_{5\frac{1}{2}}$	−11
4529.910	6	*MB*	22069.305	$11742^{\circ}_{5\frac{1}{2}} - 33811_{4\frac{1}{2}}$	−16	4560.543	5	*MB*	21921.069	$10314_{4\frac{1}{2}} - 32235^{\circ}_{3\frac{1}{2}}$	−7
				$11340^{\circ}_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	7	4560.959	220	*MB*	21919.070	$5513_{5\frac{1}{2}} - 27432^{\circ}_{4\frac{1}{2}}$	−2
4530.080	2	*MB*	22068.477	$25361_{4\frac{1}{2}} - 47430^{\circ}_{3\frac{1}{2}}$	−32	4561.264	5	*MB*	21917.604		
4530.127	1	*WA*	22068.248	$5118^{\circ}_{2\frac{1}{2}} - 27187_{3\frac{1}{2}}$	7	4561.558	4	*MB*	21916.191	$7522^{\circ}_{5\frac{1}{2}} - 29438_{5\frac{1}{2}}$	−4
4530.827	20	*MB*	22064.839	$10820_{2\frac{1}{2}} - 32885^{\circ}_{2\frac{1}{2}}$	−41					$7878^{\circ}_{3\frac{1}{2}} - 29794_{3\frac{1}{2}}$	3
4531.634	5	*MB*	22060.909	$7746^{\circ}_{2\frac{1}{2}} - 29807_{3\frac{1}{2}}$	17	4562.358	1500	*MB*	21912.348	$3854_{3\frac{1}{2}} - 25766^{\circ}_{4\frac{1}{2}}$	6
4532.486	80	*MB*	22056.762	$13659^{\circ}_{4\frac{1}{2}} - 35716_{5\frac{1}{2}}$	9	4563.039	5	*MB*	21909.078	$11387^{\circ}_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	4
4532.798	1	*WA*	22055.244	$5651^{\circ}_{5\frac{1}{2}} - 27706_{6\frac{1}{2}}$	−29					$1873^{\circ}_{3\frac{1}{2}} - 23782_{2\frac{1}{2}}$	21
4533.227	3	*MB*	22053.157	$10454^{\circ}_{1\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−12	4563.360	20	*MB*	21907.537	$7259^{\circ}_{3\frac{1}{2}} - 29166_{4\frac{1}{2}}$	15
4533.862	2	*MB*	22050.068	$10088^{\circ}_{1\frac{1}{2}} - 32138_{2\frac{1}{2}}$	11					$6389^{\circ}_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	6
4534.216	20	*MB*	22048.347	$7746^{\circ}_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	15	4563.863	5	*MB*	21905.123	$2595^{\circ}_{1\frac{1}{2}} - 24500_{2\frac{1}{2}}$	11
4535.355	2	*WA*	22042.810	$8702^{\circ}_{1\frac{1}{2}} - 30745_{1\frac{1}{2}}$	−31	4564.758	5	*MB*	21900.828	$9269^{\circ}_{0\frac{1}{2}} - 31170_{1\frac{1}{2}}$	9
4536.642	6	*MB*	22036.557	$9198^{\circ}_{3\frac{1}{2}} - 31234_{2\frac{1}{2}}$	4	4565.051	3	*MB*	21899.422	$13659^{\circ}_{4\frac{1}{2}} - 35558_{3\frac{1}{2}}$	50
4536.887	60	*MB*	22035.367	$12260^{\circ}_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	5	4565.841	300	*MB*	21895.633	$8774_{4\frac{1}{2}} - 30669^{\circ}_{4\frac{1}{2}}$	−4
4537.871	50	*MB*	22030.589	$7878^{\circ}_{3\frac{1}{2}} - 29908_{4\frac{1}{2}}$	13	4566.199	2	*MB*	21893.916		
4538.422	10	*MB*	22027.914	$9316_{3\frac{1}{2}} - 31344^{\circ}_{3\frac{1}{2}}$	−1	4567.161	5	*MB*	21889.305	$8175^{\circ}_{2\frac{1}{2}} - 30065_{3\frac{1}{2}}$	4
4539.070	80	*MB*	22024.769	$11015_{3\frac{1}{2}} - 33040^{\circ}_{4\frac{1}{2}}$	−4	4567.391	8	*MB*	21888.203	$5924^{\circ}_{1\frac{1}{2}} - 27812_{2\frac{1}{2}}$	9
4539.276	9	*MB*	22023.770	$10114^{\circ}_{2\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−44	4568.029	1	*MB*	21885.146	$8280^{\circ}_{2\frac{1}{2}} - 30166_{3\frac{1}{2}}$	35

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4569.665	30	*MB*	21877.311	$9198°_{3\frac{1}{2}} - 31075_{4\frac{1}{2}}$	34
				$10924°_{4\frac{1}{2}} - 32802_{5\frac{1}{2}}$	22
4570.398	2	*MB*	21873.802		
4571.066	1	*MB*	21870.606		
4571.467	6	*MB*	21868.687	$5942°_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−10
4572.011	7	*MB*	21866.085	$2634°_{2\frac{1}{2}} - 24500_{2\frac{1}{2}}$	−4
4572.281	750	*MB*	21864.794	$5513_{5\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	−11
4572.783	60	*MB*	21862.393	$11949°_{3\frac{1}{2}} - 33811_{4\frac{1}{2}}$	16
4572.996	4	*MB*	21861.375	$13436_{2\frac{1}{2}} - 35298°_{2\frac{1}{2}}$	40
4573.208	2	*MB*	21860.362		
4573.264	2	*MB*	21860.094		
4573.467	2	*WA*	21859.124	$11949°_{3\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−3
4573.917	1	*MB*	21856.973	$1410°_{4\frac{1}{2}} - 23267_{3\frac{1}{2}}$	−73
4574.843	1	*MB*	21852.549	$11007°_{1\frac{1}{2}} - 32860_{0\frac{1}{2}}$	−4
4575.483	2	*MB*	21849.493		
4575.744	1	*MB*	21848.246		
4576.083	1	*MB*	21846.628	$5964°_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	28
4576.470	40	*MB*	21844.781	$9198°_{3\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−2
4576.802	3	*MB*	21843.196	$8402°_{3\frac{1}{2}} - 30245_{4\frac{1}{2}}$	−13
4577.558	2	*MB*	21839.589	$10798°_{2\frac{1}{2}} - 32638_{1\frac{1}{2}}$	−20
4577.701	1	*MB*	21838.906	$5675°_{4\frac{1}{2}} - 27514_{3\frac{1}{2}}$	10
4578.463	4	*MB*	21835.272	$9723°_{4\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−18
4578.779	50	*MB*	21833.765	$13027_{6\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	−2
4579.159	2	*MB*	21831.953		
4579.212	2	*MB*	21831.700		
4579.258	60	*MB*	21831.481	$20881_{6\frac{1}{2}} - 42712°_{6\frac{1}{2}}$	6
4580.772	1	*MB*	21824.266	$8169°_{1\frac{1}{2}} - 29994_{2\frac{1}{2}}$	−76
4580.985	6	*MB*	21823.251		
4581.335	3	*MB*	21821.583		
4581.513	1	*MB*	21820.736		
4582.050	2	*MB*	21818.179	$8175°_{2\frac{1}{2}} - 29994_{2\frac{1}{2}}$	1
4582.409	10	*MB*	21816.469	$6521°_{1\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−12
4582.500	300	*MB*	21816.036	$5616_{4\frac{1}{2}} - 27432°_{4\frac{1}{2}}$	−6
4583.381	1	*MB*	21811.843		
4584.144	1	*MB*	21808.212	$8175°_{2\frac{1}{2}} - 29984_{1\frac{1}{2}}$	24
4584.189	2	*MB*	21807.998	$11340°_{3\frac{1}{2}} - 33148_{2\frac{1}{2}}$	8
4584.383	1	*MB*	21807.075	$5010°_{2\frac{1}{2}} - 26817_{2\frac{1}{2}}$	10
4585.183	2	*MB*	21803.271		
4585.506	1	*MB*	21801.735	$19946°_{1\frac{1}{2}} - 41748_{1\frac{1}{2}}$	24
4585.585	1	*MB*	21801.359		
4586.212	4	*MB*	21798.379	$5716°_{3\frac{1}{2}} - 27514_{3\frac{1}{2}}$	−64
4586.396	1	*MB*	21797.504		
4586.688	2	*MB*	21796.117		
4586.828	1	*MB*	21795.451	$7878°_{3\frac{1}{2}} - 29673_{2\frac{1}{2}}$	10
4587.097	1	*MB*	21794.173		
4587.585	1	*MB*	21791.855		
4587.704	1	*MB*	21791.290		
4588.414	5	*MB*	21787.918	$6549°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	12
4589.164	5	*MB*	21784.357	$12260°_{3\frac{1}{2}} - 34044_{4\frac{1}{2}}$	4
4589.373	5	*MB*	21783.365	$2879°_{5\frac{1}{2}} - 24663_{4\frac{1}{2}}$	5
4590.154	4	*MB*	21779.659	$9778°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	19
4590.485	1	*MB*	21778.088	$16192°_{4\frac{1}{2}} - 37970_{5\frac{1}{2}}$	23
4590.729	1	*MB*	21776.931	$15565°_{2\frac{1}{2}} - 37342_{3\frac{1}{2}}$	24
4591.115	90	*MB*	21775.100	$8927°_{5\frac{1}{2}} - 30702_{4\frac{1}{2}}$	4
4591.566	3	*MB*	21772.961	$8896_{5\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	−11
4591.932	2	*MB*	21771.226	$2382°_{4\frac{1}{2}} - 24153_{3\frac{1}{2}}$	6
4592.901	5	*MB*	21766.633	$1873°_{3\frac{1}{2}} - 23640_{4\frac{1}{2}}$	4
4593.348	1	*MB*	21764.514		
4593.417	3	*MB*	21764.187		
4593.716	7	*MB*	21762.771	$9269°_{0\frac{1}{2}} - 31032_{0\frac{1}{2}}$	−13
				$10088°_{1\frac{1}{2}} - 31851_{2\frac{1}{2}}$	14
4593.924	600	*MB*	21761.785	$5616_{4\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	10
4595.227	1	*MB*	21755.615	$13012°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	19
4596.151	2	*MB*	21751.241	$12057°_{2\frac{1}{2}} - 33808_{2\frac{1}{2}}$	32
4596.310	1	*MB*	21750.489	$7278°_{1\frac{1}{2}} - 29029_{1\frac{1}{2}}$	58
4596.927	5	*MB*	21747.570	$6549°_{2\frac{1}{2}} - 28297_{3\frac{1}{2}}$	5
4597.158	40	*MB*	21746.477	$10869_{4\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	0
4598.036	1	*MB*	21742.324		
4598.754	1	*MB*	21738.930	$11340°_{3\frac{1}{2}} - 33079_{3\frac{1}{2}}$	16
4599.026	16	*MB*	21737.644	$5969°_{5\frac{1}{2}} - 27706_{6\frac{1}{2}}$	20
4599.591	6	*MB*	21734.974	$9634°_{1\frac{1}{2}} - 31369_{2\frac{1}{2}}$	67
4600.619	1	*MB*	21730.117		
4600.720	1	*MB*	21729.641		
4601.375	25	*MB*	21726.547	$10646_{5\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	−3
4601.551	2	*MB*	21725.716	$7713°_{4\frac{1}{2}} - 29438_{5\frac{1}{2}}$	−11
4601.823	4	*MB*	21724.432	$11325°_{2\frac{1}{2}} - 33050_{1\frac{1}{2}}$	−77
4602.150	2	*WA*	21722.888	$8702°_{1\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−16
4602.518	5	*MB*	21721.152	$6913°_{6\frac{1}{2}} - 28634_{5\frac{1}{2}}$	28
4603.188	1	*MB*	21717.990		
4603.384	3	*MB*	21717.066	$12260°_{3\frac{1}{2}} - 33977_{3\frac{1}{2}}$	14
4603.578	2	*MB*	21716.150		
4604.220	16	*MB*	21713.122	$8280°_{2\frac{1}{2}} - 29994_{2\frac{1}{2}}$	28
4605.108	1	*WA*	21708.936	$10798°_{2\frac{1}{2}} - 32507_{1\frac{1}{2}}$	49
4605.483	25	*MB*	21707.168	$9316_{3\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	4
4606.116	1	*MB*	21704.185	$5675°_{4\frac{1}{2}} - 27379_{5\frac{1}{2}}$	0
4606.244	1	*MB*	21703.582	$7746°_{2\frac{1}{2}} - 29449_{1\frac{1}{2}}$	−10
4606.399	300	*MB*	21702.851	$7341_{5\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	5
4607.083	5	*MB*	21699.629	$12466°_{1\frac{1}{2}} - 34166_{1\frac{1}{2}}$	21
4607.286	2	*MB*	21698.673	$13758°_{1\frac{1}{2}} - 35457_{1\frac{1}{2}}$	25
4607.745	4	*MB*	21696.512	$6638°_{4\frac{1}{2}} - 28334_{4\frac{1}{2}}$	14
4607.948	3	*MB*	21695.556	$5819°_{4\frac{1}{2}} - 27514_{3\frac{1}{2}}$	9
4608.747	6	*MB*	21691.795	$11387°_{3\frac{1}{2}} - 33079_{3\frac{1}{2}}$	14
4610.316	4	*MB*	21684.413	$10454°_{1\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−12
4611.543	60	*MB*	21678.643	$12365°_{4\frac{1}{2}} - 34044_{4\frac{1}{2}}$	8
4611.789	1	*MB*	21677.487	$10088°_{1\frac{1}{2}} - 31766_{1\frac{1}{2}}$	18
4611.950	3	*MB*	21676.730	$10641°_{2\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−2
4613.008	50	*MB*	21671.758	$8448_{2\frac{1}{2}} - 30120°_{1\frac{1}{2}}$	−6
4613.530	2	*MB*	21669.307	$10703_{4\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	−8
4614.018	2	*WA*	21667.015	$15565°_{2\frac{1}{2}} - 37232_{1\frac{1}{2}}$	−2
4614.220	4	*MB*	21666.066	$7059°_{4\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−9

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4614.939	1	*MB*	21662.691	$10274°_{3\frac{1}{2}}-31937_{3\frac{1}{2}}$	9	4641.865	1	*MB*	21537.034	$11325°_{2\frac{1}{2}}-32862_{3\frac{1}{2}}$	48
4614.962	2	*WA*	21662.583	$8402°_{3\frac{1}{2}}-30065_{3\frac{1}{2}}$	87	4641.986	1	*WA*	21536.473	$9634°_{1\frac{1}{2}}-31170_{1\frac{1}{2}}$	14
4615.688	2	*WA*	21659.175	$6638°_{4\frac{1}{2}}-28297_{3\frac{1}{2}}$	−39	4642.262	3	*MB*	21535.192	$7746°_{2\frac{1}{2}}-29281_{2\frac{1}{2}}$	3
4615.920	1	*MB*	21658.087	$3703°_{3\frac{1}{2}}-25361_{4\frac{1}{2}}$	7	4642.639	1	*MB*	21533.444	$5716°_{3\frac{1}{2}}-27249_{2\frac{1}{2}}$	−8
4616.078	6	*MB*	21657.346	$11387°_{3\frac{1}{2}}-33045_{2\frac{1}{2}}$	−17	4642.756	1	*MB*	21532.901	$12762°_{4\frac{1}{2}}-34295_{4\frac{1}{2}}$	92
4616.363	2	*WA*	21656.009	$10274°_{3\frac{1}{2}}-31930_{4\frac{1}{2}}$	44	4642.892	1	*WA*	21532.270	$10035°_{5\frac{1}{2}}-31568_{4\frac{1}{2}}$	−37
4616.437	1	*MB*	21655.661	$14481°_{2\frac{1}{2}}-36137_{2\frac{1}{2}}$	−12	4642.969	2	*WA*	21531.913	$10703_{4\frac{1}{2}}-32235°_{3\frac{1}{2}}$	−20
4616.643	3	*MB*	21654.695			4643.775	4	*MB*	21528.176	$7202°_{2\frac{1}{2}}-28730_{3\frac{1}{2}}$	−6
4617.378	2	*WA*	21651.248	$10114°_{2\frac{1}{2}}-31766_{1\frac{1}{2}}$	22	4644.211	50	*MB*	21526.155	$8280°_{2\frac{1}{2}}-29807_{3\frac{1}{2}}$	23
4618.306	1	*MB*				4645.619	3	*MB*	21519.631	$22903_{1\frac{1}{2}}-44423°_{1\frac{1}{2}}$	30
										$10798°_{2\frac{1}{2}}-32318_{3\frac{1}{2}}$	11
4618.930	5	*MB*	21643.973	$7522°_{5\frac{1}{2}}-29166_{4\frac{1}{2}}$	−2						
4619.195	3	*MB*	21642.732			4645.801	4	*MB*	21518.788	$2634°_{2\frac{1}{2}}-24153_{3\frac{1}{2}}$	−11
4619.279	1	*MB*	21642.338			4646.166	1	*MB*	21517.097	$12057°_{2\frac{1}{2}}-33574_{1\frac{1}{2}}$	60
4621.742	2	*MB*	21630.805	$9198°_{3\frac{1}{2}}-30829_{3\frac{1}{2}}$	7	4646.571	1	*WA*	21515.222	$6389°_{4\frac{1}{2}}-27905_{4\frac{1}{2}}$	7
4621.903	1	*WA*	21630.051	$10684°_{0\frac{1}{2}}-32314_{0\frac{1}{2}}$	23	4647.285	30	*MB*	21511.917	$2641°_{3\frac{1}{2}}-24153_{3\frac{1}{2}}$	10
4623.478	5	*MB*	21622.683	$4322°_{2\frac{1}{2}}-25945_{3\frac{1}{2}}$	−4	4647.422	30	*MB*	21511.282	$5675°_{4\frac{1}{2}}-27187_{3\frac{1}{2}}$	−1
4624.360	4	*MB*	21618.559	$7746°_{2\frac{1}{2}}-29364_{3\frac{1}{2}}$	4	4648.290	2	*WA*	21507.266	$4844°_{1\frac{1}{2}}-26351_{0\frac{1}{2}}$	0
4624.895	300	*MB*	21616.058	$9053_{3\frac{1}{2}}-30669°_{4\frac{1}{2}}$	−14	4648.369	1	*MB*	21506.900	$7522°_{0\frac{1}{2}}-29029_{1\frac{1}{2}}$	5
4625.291	3	*MB*	21614.207	$3745°_{1\frac{1}{2}}-25359_{2\frac{1}{2}}$	−3	4648.510	2	*MB*	21506.248	$8402°_{3\frac{1}{2}}-29908_{4\frac{1}{2}}$	12
4625.656	1	*MB*	21612.502			4648.937	1	*WA*	21504.272	$9198°_{3\frac{1}{2}}-30702_{4\frac{1}{2}}$	−11
4625.827	1	*MB*	21611.703			4649.797	1	*MB*	21500.295	$8448_{2\frac{1}{2}}-29948°_{2\frac{1}{2}}$	22
4627.435	5	*MB*	21604.193	$8131_{4\frac{1}{2}}-29735°_{4\frac{1}{2}}$	−2	4650.834	1	*MB*	21495.501	$12057°_{2\frac{1}{2}}-33552_{2\frac{1}{2}}$	27
4628.157	1200	*MB*	21600.823	$4165_{4\frac{1}{2}}-25766°_{4\frac{1}{2}}$	18	4651.470	2	*WA*	21492.562	$16159°_{3\frac{1}{2}}-37652_{2\frac{1}{2}}$	8
4628.240	8	*MB*	21600.436	$11015_{3\frac{1}{2}}-32616°_{4\frac{1}{2}}$	−3	4651.631	5	*MB*	21491.818		
4628.828	2	*MB*	21597.692			4651.683	6	*MB*	21491.578	$7233°_{5\frac{1}{2}}-28725_{4\frac{1}{2}}$	57
4629.358	1	*MB*	21595.219			4651.880	1	*MB*	21490.668		
4629.965	3	*MB*	21592.388			4652.110	2	*MB*	21489.605		
4630.184	2	*WA*	21591.367	$8402°_{3\frac{1}{2}}-29994_{2\frac{1}{2}}$	−5	4652.355	1	*MB*	21488.474	$10924°_{4\frac{1}{2}}-32413_{3\frac{1}{2}}$	4
4630.380	2	*MB*	21590.453			4652.990	1	*MB*	21485.541	$4459°_{3\frac{1}{2}}-25945_{3\frac{1}{2}}$	18
4630.438	2	*MB*	21590.182	$9778°_{2\frac{1}{2}}-31369_{2\frac{1}{2}}$	76	4653.500	1	*MB*	21483.187	$7202°_{2\frac{1}{2}}-28685_{2\frac{1}{2}}$	−41
4630.816	30	*WA*	21588.420			4654.278	90	*MB*	21479.595	$4201°_{1\frac{1}{2}}-25681_{1\frac{1}{2}}$	1
4631.541	1	*MB*	21585.041			4655.819	4	*MB*	21472.486	$8278_{5\frac{1}{2}}-29750°_{5\frac{1}{2}}$	−6
4632.195	2	*MB*	21581.993	$11458_{5\frac{1}{2}}-33040°_{4\frac{1}{2}}$	−6	4656.004	8	*MB*	21471.633	$7259°_{3\frac{1}{2}}-28730_{3\frac{1}{2}}$	−3
4633.606	25	*MB*	21575.421	$7059°_{4\frac{1}{2}}-28634_{5\frac{1}{2}}$	−22	4656.179	5	*MB*	21470.826	$5716°_{3\frac{1}{2}}-27187_{3\frac{1}{2}}$	−4
4634.372	1	*WA*	21571.855	$5942°_{3\frac{1}{2}}-27514_{3\frac{1}{2}}$	−6	4656.343	1	*WA*	21470.070	$9491°_{0\frac{1}{2}}-30961_{1\frac{1}{2}}$	45
4635.108	1	*MB*	21568.430	$9771_{7\frac{1}{2}}-31340°_{6\frac{1}{2}}$	−6	4657.007	6	*MB*	21467.009	$13758°_{1\frac{1}{2}}-35225_{2\frac{1}{2}}$	23
4635.379	2	*WA*	21567.169	$10924°_{4\frac{1}{2}}-32492_{5\frac{1}{2}}$	8	4657.210	5	*MB*	21466.073	$7259°_{3\frac{1}{2}}-28725_{4\frac{1}{2}}$	0
4636.450	3	*MB*	21562.187			4657.827	5	*MB*	21463.230	$7818°_{1\frac{1}{2}}-29281_{2\frac{1}{2}}$	3
4636.740	30	*MB*	21560.839	$5819°_{4\frac{1}{2}}-27379_{5\frac{1}{2}}$	3	4658.371	3	*MB*	21460.723	$11949°_{3\frac{1}{2}}-33409_{3\frac{1}{2}}$	16
4638.091	2	*MB*	21554.558	$11742°_{5\frac{1}{2}}-33296_{4\frac{1}{2}}$	−1	4659.105	1	*MB*	21457.342	$8278_{5\frac{1}{2}}-29735°_{4\frac{1}{2}}$	−16
4638.595	1	*MB*	21552.217			4659.415	40	*MB*	21455.915	$9778°_{2\frac{1}{2}}-31234_{2\frac{1}{2}}$	22
4638.749	4	*MB*	21551.501	$12260°_{3\frac{1}{2}}-33811_{4\frac{1}{2}}$	22					$3363°_{2\frac{1}{2}}-24819_{3\frac{1}{2}}$	8
4639.166	5	*MB*	21549.564	$4203°_{6\frac{1}{2}}-25753_{6\frac{1}{2}}$	5	4659.936	25	*MB*	21453.516	$7713°_{4\frac{1}{2}}-29166_{4\frac{1}{2}}$	8
4639.326	1	*MB*	21548.821			4660.570	2	*MB*	21450.597		
4639.781	5	*MB*	21546.708			4660.915	2	*MB*	21449.010		
4640.219	3	*MB*	21544.674	$6389°_{4\frac{1}{2}}-27934_{4\frac{1}{2}}$	−21	4661.622	3	*MB*	21445.757	$12365°_{4\frac{1}{2}}-33811_{4\frac{1}{2}}$	−3
4640.436	3	*MB*	21543.666	$12751°_{5\frac{1}{2}}-34295_{4\frac{1}{2}}$	−1	4662.056	1	*MB*	21443.760	$14481°_{2\frac{1}{2}}-35925_{3\frac{1}{2}}$	9
4640.985	2	*MB*	21541.118	$9491°_{0\frac{1}{2}}-31032_{0\frac{1}{2}}$	0					$10114°_{2\frac{1}{2}}-31558_{3\frac{1}{2}}$	18
4641.368	1	*MB*	21539.340			4662.502	2	*WA*	21441.709	$8804°_{4\frac{1}{2}}-30245_{4\frac{1}{2}}$	55
4641.754	4	*MB*	21537.549			4662.577	1	*MB*	21441.364		

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4662.917	1	*MB*	21439.801			4687.277	1	*MB*	21328.379	$15565°_{2\frac{1}{2}} - 36893_{3\frac{1}{2}}$	29
4663.070	9	*MB*	21439.097	$13758°_{1\frac{1}{2}} - 35197_{1\frac{1}{2}}$	−72	4687.614	5	*MB*	21326.846	$8423_{6\frac{1}{2}} - 29750°_{5\frac{1}{2}}$	−28
4663.232	30	*MB*	21438.353	$12097_{3\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	−6	4687.907	1	*WA*	21325.513	$5924°_{1\frac{1}{2}} - 27249_{2\frac{1}{2}}$	48
4664.143	2	*MB*	21434.165	$4511°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	27	4689.478	16	*MB*	21318.369	$8927°_{5\frac{1}{2}} - 30245_{4\frac{1}{2}}$	5
4665.276	25	*MB*	21428.960	$16159°_{3\frac{1}{2}} - 37588_{3\frac{1}{2}}$	23	4689.760	3	*MB*	21317.087	$27950_{5\frac{1}{2}} - 49267°_{4\frac{1}{2}}$	−5
				$9778°_{2\frac{1}{2}} - 31207_{3\frac{1}{2}}$	19						
						4689.873	1	*MB*	21316.573		
4665.795	2	*MB*				4690.160	20	*MB*	21315.269	$7011_{4\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	2
4666.215	2	*MB*	21424.648			4690.480	25	*MB*	21313.815	$8278_{5\frac{1}{2}} - 29591°_{6\frac{1}{2}}$	−3
4666.710	25	*MB*	21422.375	$4523°_{4\frac{1}{2}} - 25945_{3\frac{1}{2}}$	12	4692.008	40	*MB*	21306.874	$5942°_{3\frac{1}{2}} - 27249_{2\frac{1}{2}}$	3
4666.890	2	*MB*	21421.549	$6389°_{4\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−4	4692.976	1	*MB*	21302.479		
4668.549	1	*MB*	21413.937	$13012°_{2\frac{1}{2}} - 34426_{2\frac{1}{2}}$	−4	4693.897	2	*WA*	21298.299	$9725_{3\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	−43
4668.745	2	*MB*	21413.038	$13784°_{1\frac{1}{2}} - 35197_{1\frac{1}{2}}$	32	4693.992	3	*MB*	21297.868		
4668.940	1	*MB*	21412.144			4694.325	4	*MB*	21296.357	$6638°_{4\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−22
4669.225	1	*MB*	21410.837			4694.870	60	*MB*	21293.885	$6517°_{2\frac{1}{2}} - 27811_{3\frac{1}{2}}$	8
4669.499	80	*MB*	21409.580	$11454_{6\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	3	4695.056	3	*MB*	21293.042	$10274°_{3\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−5
4670.096	6	*MB*	21406.843	$7278°_{1\frac{1}{2}} - 28685_{2\frac{1}{2}}$	8	4695.139	2	*MB*	21292.665	$12751°_{5\frac{1}{2}} - 34044_{4\frac{1}{2}}$	6
4670.300	1	*WA*	21405.909	$11458_{5\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	−15	4695.374	3	*MB*	21291.599	$8702°_{1\frac{1}{2}} - 29994_{2\frac{1}{2}}$	3
4670.445	2	*WA*	21405.244	$9725_{3\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	−5	4695.497	3	*MB*	21291.042	$6521°_{1\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−23
4670.514	6	*MB*	21404.928	$13515°_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	−6	4695.924	1	*MB*	21289.106		
4670.725	60	*MB*	21403.961	$5437°_{3\frac{1}{2}} - 26841_{4\frac{1}{2}}$	0	4696.178	4	*MB*	21287.954		
4671.400	5	*MB*	21400.868	$7233°_{5\frac{1}{2}} - 28634_{5\frac{1}{2}}$	−20	4696.758	5	*MB*	21285.326	$6549°_{2\frac{1}{2}} - 27835_{1\frac{1}{2}}$	1
4671.928	1	*MB*	21398.449	$9634°_{1\frac{1}{2}} - 31032_{0\frac{1}{2}}$	25	4697.127	1	*MB*	21283.653	$10274°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−1
4672.216	2	*MB*	21397.130	$10454°_{1\frac{1}{2}} - 31851_{2\frac{1}{2}}$	6	4697.220	2	*MB*	21283.232	$7746°_{2\frac{1}{2}} - 29029_{1\frac{1}{2}}$	64
4673.074	1	*MB*	21393.202	$10924°_{4\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−96	4697.467	1	*MB*	21282.113	$10058_{6\frac{1}{2}} - 31340°_{6\frac{1}{2}}$	−53
4673.412	2	*WA*	21391.655	$9778°_{2\frac{1}{2}} - 31170_{1\frac{1}{2}}$	−3	4697.538	1	*MB*	21281.791	$12762°_{4\frac{1}{2}} - 34044_{4\frac{1}{2}}$	−8
4673.580	1	*MB*	21390.886	$11325°_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	20	4697.742	4	*MB*	21280.867	$11759_{5\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	−18
4674.888	6	*MB*	21384.901			4698.188	3	*MB*	21278.847	$15565°_{2\frac{1}{2}} - 36844_{2\frac{1}{2}}$	−37
4675.180	4	*MB*				4698.500	1	*MB*	21277.434	$19920°_{3\frac{1}{2}} - 41198_{2\frac{1}{2}}$	−61
4676.954	4	*MB*	21375.454			4698.682	1	*MB*			
4677.355	1	*WA*	21373.622	$0°_{3\frac{1}{2}} - 21373_{1\frac{1}{2}}$	0	4698.724	1	*MB*	21276.420		
4678.007	2	*WA*	21370.643	$17171°_{5\frac{1}{2}} - 38541_{4\frac{1}{2}}$	15	4698.886	3	*MB*	21275.686	$7059°_{4\frac{1}{2}} - 28334_{4\frac{1}{2}}$	2
4678.599	6	*MB*	21367.939	$5819°_{4\frac{1}{2}} - 27187_{3\frac{1}{2}}$	5	4699.286	3	*MB*	21273.875	$8175°_{2\frac{1}{2}} - 29449_{1\frac{1}{2}}$	−39
4678.932	3	*MB*	21366.418	$9723°_{4\frac{1}{2}} - 31089_{5\frac{1}{2}}$	22	4700.867	2	*MB*	21266.720		
4679.089	4	*MB*	21365.701	$10869_{4\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	3	4701.434	60	*MB*	21264.156	$9778°_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	32
4679.409	4	*MB*	21364.240	$3995°_{3\frac{1}{2}} - 25359_{2\frac{1}{2}}$	14	4701.998	60	*MB*	21261.605	$6549°_{2\frac{1}{2}} - 27811_{3\frac{1}{2}}$	17
4679.935	2	*MB*	21361.839	$8804°_{4\frac{1}{2}} - 30166_{3\frac{1}{2}}$	6	4702.140	1	*MB*	21260.963	$8804°_{4\frac{1}{2}} - 30065_{3\frac{1}{2}}$	23
4680.120	130	*MB*	21360.995	$8531_{3\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	−3	4702.471	3	*MB*			
4680.439	7	*MB*	21359.539	$6967_{6\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	15	4702.720	8	*MB*	21258.341	$2382°_{4\frac{1}{2}} - 23640_{4\frac{1}{2}}$	24
4680.612	2	*WA*	21358.749	$4322°_{2\frac{1}{2}} - 25681_{1\frac{1}{2}}$	−30	4703.293	2	*MB*	21255.751		
4680.798	1	*MB*	21357.901			4703.634	2	*MB*	21254.210	$10114°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	0
4680.985	25	*MB*	21357.047	$11015_{3\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	6	4703.990	10	*MB*	21252.602	$8927°_{5\frac{1}{2}} - 30180_{6\frac{1}{2}}$	20
4681.909	1	*MB*	21352.832	$9316_{3\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	43	4704.546	1	*MB*	21250.090		
4683.044	3	*MB*	21347.657	$11949°_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	42	4705.777	3	*MB*	21244.531		
4684.310	3	*MB*	21341.888	$12466°_{1\frac{1}{2}} - 33808_{2\frac{1}{2}}$	1	4705.836	4	*MB*	21244.265	$5942°_{3\frac{1}{2}} - 27187_{3\frac{1}{2}}$	16
4684.599	240	*MB*	21340.571	$7293°_{6\frac{1}{2}} - 28634_{5\frac{1}{2}}$	−6	4707.117	1	*MB*	21238.483	$7059°_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	83
4685.213	50	*MB*	21337.775	$7011_{4\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	−2	4707.476	1	*MB*	21236.864	$19483_{2\frac{1}{2}} - 40720°_{1\frac{1}{2}}$	−32
4686.143	2	*MB*	21333.540	$12326°_{6\frac{1}{2}} - 33659_{5\frac{1}{2}}$	−10	4707.933	40	*MB*	21234.802	$7092_{5\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	−3
4686.699	4	*MB*	21331.009	$8789_{2\frac{1}{2}} - 30120°_{1\frac{1}{2}}$	−16	4708.678	4	*MB*	21231.443		
4686.772	60	*MB*	21330.677	$8804°_{4\frac{1}{2}} - 30134_{5\frac{1}{2}}$	−8	4709.036	1	*MB*			
4687.158	2	*MB*	21328.920	$11387°_{3\frac{1}{2}} - 32716_{2\frac{1}{2}}$	5	4709.292	1	*MB*	21228.675	$17300°_{3\frac{1}{2}} - 38529_{2\frac{1}{2}}$	−35

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4710.002	20	*MB*	21225.474	$3593°_{4\frac{1}{2}}-24819_{3\frac{1}{2}}$	23						
4710.206	4	*MB*	21224.555	$27432°_{4\frac{1}{2}}-48657_{3\frac{1}{2}}$	1	4739.570	2	*MB*	21093.060	$10114°_{2\frac{1}{2}}-31207_{3\frac{1}{2}}$	17
				$5675°_{4\frac{1}{2}}-26900_{3\frac{1}{2}}$	−35	4739.930	1	*MB*	21091.458	$12057°_{2\frac{1}{2}}-33148_{2\frac{1}{2}}$	−23
4711.294	1	*MB*	21219.654	$11015_{3\frac{1}{2}}-32235°_{3\frac{1}{2}}$	−5	4741.113	10	*MB*	21086.196	$12466°_{1\frac{1}{2}}-33552_{2\frac{1}{2}}$	44
4712.438	9	*MB*	21214.503	$12762°_{4\frac{1}{2}}-33977_{3\frac{1}{2}}$	4	4741.649	40	*MB*	21083.812	$8280°_{2\frac{1}{2}}-29364_{3\frac{1}{2}}$	19
4713.875	1	*MB*	21208.035	$4737°_{2\frac{1}{2}}-25945_{3\frac{1}{2}}$	13	4742.050	7	*MB*	21082.029	$10088°_{1\frac{1}{2}}-31170_{1\frac{1}{2}}$	25
4714.011	180	*MB*	21207.424	$8927°_{5\frac{1}{2}}-30134_{5\frac{1}{2}}$	28	4742.232	4	*MB*	21081.220	$5819°_{4\frac{1}{2}}-26900_{3\frac{1}{2}}$	−20
4714.828	90	*MB*	21203.749	$8531_{3\frac{1}{2}}-29735°_{4\frac{1}{2}}$	14	4742.800	5	*MB*	21078.696	$7259°_{3\frac{1}{2}}-28337_{2\frac{1}{2}}$	−42
4715.079	8	*MB*	21202.620	$7522°_{0\frac{1}{2}}-28725_{4\frac{1}{2}}$	−69	4743.473	8	*MB*	21075.705	$7259°_{3\frac{1}{2}}-28334_{4\frac{1}{2}}$	24
4715.532	3	*MB*	21200.583	$14097_{3\frac{1}{2}}-35298°_{2\frac{1}{2}}$	83	4743.718	6	*MB*	21074.616	$9771_{7\frac{1}{2}}-30846°_{7\frac{1}{2}}$	−9
4717.878	80	*MB*	21190.041	$5651°_{5\frac{1}{2}}-26841_{4\frac{1}{2}}$	15	4744.134	3	*MB*	21072.769	$11340°_{3\frac{1}{2}}-32413_{3\frac{1}{2}}$	21
4718.482	3	*MB*	21187.329	$2595°_{1\frac{1}{2}}-23782_{2\frac{1}{2}}$	−14	4744.238	1	*MB*	21072.307		
4718.783	3	*MB*	21185.977			4744.450	6	*MB*	21071.365		
4719.193	2	*MB*	21184.137	$5716°_{3\frac{1}{2}}-26900_{3\frac{1}{2}}$	0	4744.941	60	*MB*	21069.185	$3593°_{4\frac{1}{2}}-24663_{4\frac{1}{2}}$	12
4719.498	4	*MB*	21182.768	$16159°_{3\frac{1}{2}}-37342_{2\frac{1}{2}}$	−22	4747.167	140	*MB*	21059.305	$2581°_{4\frac{1}{2}}-23640_{4\frac{1}{2}}$	0
4719.545	3	*MB*	21182.557	$9778°_{2\frac{1}{2}}-30961_{1\frac{1}{2}}$	25	4747.257	2	*MB*	21058.906	$7278°_{1\frac{1}{2}}-28337_{2\frac{1}{2}}$	14
4720.092	4	*MB*	21180.102			4748.244	3	*MB*	21054.529	$13758°_{1\frac{1}{2}}-34813_{2\frac{1}{2}}$	−2
4721.050	6	*MB*	21175.804	$13758°_{1\frac{1}{2}}-34934_{2\frac{1}{2}}$	54	4748.364	5	*MB*	21053.996	$10035°_{5\frac{1}{2}}-31089_{5\frac{1}{2}}$	−23
4722.295	30	*MB*	21170.222	$4511°_{2\frac{1}{2}}-25681_{1\frac{1}{2}}$	−8	4749.233	9	*MB*	21050.144	$9778°_{2\frac{1}{2}}-30829_{3\frac{1}{2}}$	7
4722.749	4	*MB*	21168.186	$8423_{6\frac{1}{2}}-29591°_{6\frac{1}{2}}$	−14	4749.514	14	*MB*	21048.899	$12762°_{4\frac{1}{2}}-33811_{4\frac{1}{2}}$	−26
4723.319	30	*MB*	21165.632	$5675°_{4\frac{1}{2}}-26841_{4\frac{1}{2}}$	11	4750.596	1	*MB*	21044.105	$12365°_{4\frac{1}{2}}-33409_{3\frac{1}{2}}$	14
4724.683	3	*MB*	21159.522	$8789_{2\frac{1}{2}}-29948°_{2\frac{1}{2}}$	−11	4751.543	20	*MB*	21039.911	$10035°_{5\frac{1}{2}}-31075_{4\frac{1}{2}}$	19
4725.068	100	*MB*	21157.798	$4201°_{1\frac{1}{2}}-25359_{2\frac{1}{2}}$	5	4752.080	2	*MB*	21037.533	$6913°_{6\frac{1}{2}}-27950_{5\frac{1}{2}}$	34
4725.103	8	*MB*	21157.641	$11458_{5\frac{1}{2}}-32616°_{4\frac{1}{2}}$	−24	4752.258	25	*MB*	21036.745	$12260°_{3\frac{1}{2}}-33296_{4\frac{1}{2}}$	28
4726.852	5	*MB*	21149.812	$12260°_{3\frac{1}{2}}-33409_{3\frac{1}{2}}$	4	4753.636	5	*MB*	21030.647	$10314_{4\frac{1}{2}}-31344°_{3\frac{1}{2}}$	−18
4727.638	3	*MB*	21146.296	$10820_{2\frac{1}{2}}-31966°_{2\frac{1}{2}}$	34	4754.765	4	*MB*	21025.653	$11387°_{3\frac{1}{2}}-32413_{3\frac{1}{2}}$	39
4728.194	1	*MB*	21143.810	$27187_{3\frac{1}{2}}-48330°_{3\frac{1}{2}}$	67	4754.904	3	*MB*	21025.039		
4728.713	7	*MB*	21141.489	$2641°_{3\frac{1}{2}}-23782_{2\frac{1}{2}}$	57	4755.527	50	*MB*	21022.285	$5819°_{4\frac{1}{2}}-26841_{4\frac{1}{2}}$	14
4729.261	2	*MB*	21139.039	$10798°_{2\frac{1}{2}}-31937_{3\frac{1}{2}}$	−58	4756.053	12	*MB*	21019.960		
4729.643	3	*MB*	21137.332	$3363°_{2\frac{1}{2}}-24500_{2\frac{1}{2}}$	3	4756.582	1	*MB*	21017.622	$7713°_{4\frac{1}{2}}-28730_{3\frac{1}{2}}$	0
4730.097	70	*MB*	21135.303	$7202°_{2\frac{1}{2}}-28337_{2\frac{1}{2}}$	18	4757.422	2	*MB*	21013.911	$12097_{3\frac{1}{2}}-33111°_{3\frac{1}{2}}$	24
4730.807	2	*MB*	21132.131	$8131_{4\frac{1}{2}}-29263°_{5\frac{1}{2}}$	10	4757.839	100	*MB*	21012.069	$7713°_{4\frac{1}{2}}-28725_{4\frac{1}{2}}$	10
4731.076	4	*MB*	21130.930	$11007°_{1\frac{1}{2}}-32138_{2\frac{1}{2}}$	31	4758.522	7	*MB*	21009.053	$13758°_{1\frac{1}{2}}-34767_{1\frac{1}{2}}$	36
4732.362	8	*MB*	21125.187	$5716°_{3\frac{1}{2}}-26841_{4\frac{1}{2}}$	20	4759.211	7	*MB*	21006.012	$10924°_{4\frac{1}{2}}-31930_{4\frac{1}{2}}$	−47
4732.472	1	*MB*	21124.696	$10641°_{2\frac{1}{2}}-31766_{1\frac{1}{2}}$	30	4759.922	14	*MB*	21002.874	$8804°_{4\frac{1}{2}}-29807_{3\frac{1}{2}}$	20
				$6389°_{4\frac{1}{2}}-27514_{3\frac{1}{2}}$	−21						
						4760.472	2	*MB*	21000.448	$8280°_{2\frac{1}{2}}-29281_{2\frac{1}{2}}$	20
4733.536	90	*MB*	21119.948	$10114°_{2\frac{1}{2}}-31234_{2\frac{1}{2}}$	−47	4760.794	4	*MB*	20999.027	$2641°_{3\frac{1}{2}}-23640_{4\frac{1}{2}}$	23
				$10035°_{5\frac{1}{2}}-31155_{6\frac{1}{2}}$	36	4761.736	4	*MB*	20994.873	$19481_{4\frac{1}{2}}-40475°_{3\frac{1}{2}}$	−11
4733.839	5	*MB*	21118.596	$8774_{4\frac{1}{2}}-29892°_{3\frac{1}{2}}$	−16	4761.939	2	*MB*			
4735.332	20	*MB*	21111.938	$7522°_{5\frac{1}{2}}-28634_{5\frac{1}{2}}$	44	4762.294	3	*MB*	20992.413	$11325°_{2\frac{1}{2}}-32318_{3\frac{1}{2}}$	19
4735.520	1	*MB*	21111.100	$9634°_{1\frac{1}{2}}-30745_{1\frac{1}{2}}$	0	4762.842	3	*MB*	20989.998	$6389°_{4\frac{1}{2}}-27379_{5\frac{1}{2}}$	−8
4735.687	3	*MB*	21110.355			4763.292	1	*MB*	20988.015	$12057°_{2\frac{1}{2}}-33045_{2\frac{1}{2}}$	27
4736.192	4	*MB*	21108.104			4763.732	1	*MB*	20986.076	$7341_{5\frac{1}{2}}-28327°_{5\frac{1}{2}}$	13
4736.708	6	*MB*	21105.805	$9723°_{4\frac{1}{2}}-30829_{3\frac{1}{2}}$	16	4763.908	60	*MB*	20985.301	$8278_{5\frac{1}{2}}-29263°_{5\frac{1}{2}}$	17
4736.959	4	*MB*	21104.687	$8804°_{4\frac{1}{2}}-29908_{4\frac{1}{2}}$	7	4764.077	4	*MB*	20984.557	$7746°_{2\frac{1}{2}}-28730_{3\frac{1}{2}}$	30
4737.266	280	*MB*	21103.319	$8789_{2\frac{1}{2}}-29892°_{3\frac{1}{2}}$	22						
4737.765	1	*MB*	21101.096	$7233°_{5\frac{1}{2}}-28334_{4\frac{1}{2}}$	−32	4764.466	1	*MB*	20982.843	$13784°_{1\frac{1}{2}}-34767_{1\frac{1}{2}}$	−13
4739.068	2	*MB*	21095.295	$4266°_{3\frac{1}{2}}-25361_{4\frac{1}{2}}$	18	4764.792	4	*MB*	20981.408	$8927°_{5\frac{1}{2}}-29908_{4\frac{1}{2}}$	18
4739.145	35	*MB*	21094.952	$7202°_{2\frac{1}{2}}-28297_{3\frac{1}{2}}$	8	4765.270	1	*MB*	20979.303	$9723°_{4\frac{1}{2}}-30702_{4\frac{1}{2}}$	28
4739.516	90	*MB*	21093.301	$10058_{6\frac{1}{2}}-31151°_{5\frac{1}{2}}$	−6	4765.662	1	*MB*	20977.578	$11340°_{3\frac{1}{2}}-32318_{3\frac{1}{2}}$	1
				$4266°_{3\frac{1}{2}}-25359_{2\frac{1}{2}}$	12	4766.095	1	*MB*	20975.672		

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4767.303	1	*MB*	20970.357	$28117_{7\frac{1}{2}} - 49087°_{7\frac{1}{2}}$	−3	4801.856	6	*MB*	20819.461	$12260°_{3\frac{1}{2}} - 33079_{3\frac{1}{2}}$	38
4767.567	10	*MB*	20969.196	$4523°_{4\frac{1}{2}} - 25492_{5\frac{1}{2}}$	−21	4803.362	7	*MB*	20812.934	$11325°_{2\frac{1}{2}} - 32138_{2\frac{1}{2}}$	17
4768.218	8	*MB*	20966.333	$9778°_{2\frac{1}{2}} - 30745_{1\frac{1}{2}}$	33	4803.554	7	*MB*	20812.102	$7522°_{5\frac{1}{2}} - 28334_{4\frac{1}{2}}$	−31
4768.508	4	*MB*	20965.058	$13012°_{2\frac{1}{2}} - 33977_{3\frac{1}{2}}$	13	4803.974	3	*MB*	20810.282	$11387°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	32
4768.785	90	*MB*	20963.840	$7011_{4\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	25	4804.631	3	*MB*	20807.437	$7878°_{3\frac{1}{2}} - 28685_{2\frac{1}{2}}$	7
4769.344	2	*MB*	20961.383	$8774_{4\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	34	4806.198	5	*MB*	20800.653	$10274°_{3\frac{1}{2}} - 31075_{4\frac{1}{2}}$	21
4769.783	4	*MB*	20959.454	$3703°_{3\frac{1}{2}} - 24663_{4\frac{1}{2}}$	−6	4806.512	4	*MB*	20799.294	$17171°_{5\frac{1}{2}} - 37970_{5\frac{1}{2}}$	7
4773.299	2	*MB*	20944.015	$10088°_{1\frac{1}{2}} - 31032_{0\frac{1}{2}}$	44	4806.783	3	*MB*	20798.121	$11340°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	22
4773.942	200	*MB*	20941.194	$7454_{1\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	−4	4807.005	5	*MB*	20797.161	$3703°_{3\frac{1}{2}} - 24500_{2\frac{1}{2}}$	0
4774.816	20	*MB*	20937.361	$19920°_{3\frac{1}{2}} - 40858_{4\frac{1}{2}}$	−30	4807.334	1	*MB*	20795.738	$9198°_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	23
4775.460	7	*MB*	20934.538	$5010°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	12	4808.648	5	*MB*	20790.055	$3363°_{2\frac{1}{2}} - 24153_{3\frac{1}{2}}$	16
4775.817	2	*MB*	20932.973	$10274°_{3\frac{1}{2}} - 31207_{3\frac{1}{2}}$	17	4809.076	8	*MB*			
4776.287	8	*MB*	20930.913	$12365°_{4\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−85	4809.232	1	*MB*			
4776.674	1	*MB*	20929.217	$14097_{3\frac{1}{2}} - 35026°_{4\frac{1}{2}}$	−37	4809.816	2	*MB*	20785.007	$12260°_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	0
4776.895	3	*MB*	20928.249	$10114°_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	22	4810.552	1	*MB*			
4777.245	1	*MB*	20926.716	$10820_{2\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	−40	4810.829	1	*MB*	20780.630	$10454°_{1\frac{1}{2}} - 31234_{2\frac{1}{2}}$	23
4779.422	2	*MB*	20917.184	$10641°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	0	4812.494	4	*MB*	20773.441	$7061°_{0\frac{1}{2}} - 27835_{1\frac{1}{2}}$	46
4780.086	6	*MB*	20914.278	$11458_{5\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	11	4814.614	2	*MB*	20764.294	$16159°_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	41
4780.248	25	*MB*	20913.570	$11949°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−7	4815.591	2	*MB*	20760.081	$10798°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	10
4781.482	2	*MB*	20908.172	$12751°_{5\frac{1}{2}} - 33659_{5\frac{1}{2}}$	−13	4817.235	2	*MB*	20752.996	$14963°_{5\frac{1}{2}} - 35716_{5\frac{1}{2}}$	14
4783.392	3	*MB*	20899.824	$4459°_{3\frac{1}{2}} - 25359_{2\frac{1}{2}}$	10	4817.779	1	*MB*	20750.653	$14276_{5\frac{1}{2}} - 35026°_{4\frac{1}{2}}$	7
4783.961	35	*MB*	20897.338	$12762°_{4\frac{1}{2}} - 33659_{5\frac{1}{2}}$	11	4818.291	4	*MB*	20748.448	$8280°_{2\frac{1}{2}} - 29029_{1\frac{1}{2}}$	41
4784.790	15	*MB*	20893.718	$5924°_{1\frac{1}{2}} - 26817_{2\frac{1}{2}}$	−17	4822.100	5	*MB*	20732.059	$6517°_{2\frac{1}{2}} - 27249_{2\frac{1}{2}}$	9
4785.196	12	*MB*	20891.945	$12097_{3\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	3	4822.262	4	*MB*	20731.362	$16192°_{4\frac{1}{2}} - 36923_{4\frac{1}{2}}$	40
4785.758	1	*MB*	20889.491	$12704_{1\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	−26	4822.962	1	*MB*	20728.354	$6521°_{1\frac{1}{2}} - 27249_{2\frac{1}{2}}$	17
4786.757	2	*MB*	20885.132	$2382°_{4\frac{1}{2}} - 23267_{3\frac{1}{2}}$	27	4825.750	1	*MB*	20716.378	$10454°_{1\frac{1}{2}} - 31170_{1\frac{1}{2}}$	6
4787.165	40	*MB*	20883.352	$7092_{5\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	−1	4826.246	1	*MB*	20714.249	$10114°_{2\frac{1}{2}} - 30829_{3\frac{1}{2}}$	9
4788.230	5	*MB*	20878.707	$8402°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	1					$9269°_{0\frac{1}{2}} - 29984_{1\frac{1}{2}}$	24
4788.729	8	*MB*	20876.531	$5964°_{3\frac{1}{2}} - 26841_{4\frac{1}{2}}$	44	4833.119	1	*MB*	20684.793	$16159°_{3\frac{1}{2}} - 36844_{2\frac{1}{2}}$	24
4789.568	3	*MB*	20872.875	$10088°_{1\frac{1}{2}} - 30961_{1\frac{1}{2}}$	−2	4835.279	5	*MB*	20675.553	$7259°_{3\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−9
4789.679	30	*MB*	20872.391	$5969°_{5\frac{1}{2}} - 26841_{4\frac{1}{2}}$	14	4835.673	40	*MB*	20673.868	$7722_{2\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	3
4790.773	1	*MB*	20867.624	$7818°_{1\frac{1}{2}} - 28685_{2\frac{1}{2}}$	14	4836.422	5	*MB*	20670.666	$5010°_{2\frac{1}{2}} - 25681_{1\frac{1}{2}}$	49
4790.953	1	*MB*	20866.840	$9198°_{3\frac{1}{2}} - 30065_{3\frac{1}{2}}$	3	4837.134	3	*MB*	20667.624	$3995°_{3\frac{1}{2}} - 24663_{4\frac{1}{2}}$	31
4792.607	1	*MB*	20859.639	$8169°_{1\frac{1}{2}} - 29029_{1\frac{1}{2}}$	−15	4839.628	3	*MB*	20656.973	$7293°_{6\frac{1}{2}} - 27950_{5\frac{1}{2}}$	23
4792.940	2	*MB*	20858.190	$9778°_{2\frac{1}{2}} - 30637_{2\frac{1}{2}}$	19	4839.700	2	*MB*	20656.666	$10088°_{1\frac{1}{2}} - 30745_{1\frac{1}{2}}$	20
4793.076	2	*MB*	20857.598			4841.906	1	*MB*	20647.255	$12762°_{4\frac{1}{2}} - 33409_{3\frac{1}{2}}$	0
4793.122	40	*MB*	20857.398	$11340°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	14	4842.818	1	*MB*			
4793.310	5	*MB*	20856.580	$11759_{5\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	28	4843.244	1	*MB*	20641.551	$10703_{4\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	28
4794.018	1	*MB*	20853.500	$8175°_{2\frac{1}{2}} - 29029_{1\frac{1}{2}}$	10	4844.235	9	*MB*			
4795.182	10	*MB*	20848.438	$4511°_{2\frac{1}{2}} - 25359_{2\frac{1}{2}}$	9	4844.290	25	*WA*	20637.094	$6549°_{2\frac{1}{2}} - 27187_{3\frac{1}{2}}$	−44
4795.552	8	*MB*	20846.829	$7878°_{3\frac{1}{2}} - 28725_{4\frac{1}{2}}$	9	4844.504	2	*MB*	20636.182	$13659°_{4\frac{1}{2}} - 34295_{4\frac{1}{2}}$	61
4796.537	1	*MB*	20842.548	$4910°_{5\frac{1}{2}} - 25753_{6\frac{1}{2}}$	20	4844.876	1	*MB*	20634.598	$7341_{5\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	−13
4797.344	2	*MB*	20839.042	$9053_{3\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	−5					$8804°_{4\frac{1}{2}} - 29438_{5\frac{1}{2}}$	5
4797.426	3	*MB*	20838.686	$8896_{5\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	2	4845.071	8	*MB*	20633.767	$10924°_{4\frac{1}{2}} - 31558_{3\frac{1}{2}}$	18
4797.730	4	*MB*	20837.366	$10314_{4\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	−5	4845.322	12	*MB*	20632.698	$2634°_{2\frac{1}{2}} - 23267_{3\frac{1}{2}}$	14
										$7202°_{2\frac{1}{2}} - 27835_{1\frac{1}{2}}$	−5
4797.848	2	*MB*	20836.853	$4844°_{1\frac{1}{2}} - 25681_{1\frac{1}{2}}$	9						
4798.494	1	*MB*	20834.048	$17300°_{3\frac{1}{2}} - 38134_{4\frac{1}{2}}$	−41	4845.796	8	*MB*			
4800.217	1	*MB*	20826.570	$5118°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−19	4846.586	100	*MB*	20627.318	$7722_{2\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	21
4800.905	60	*MB*	20823.586	$7293°_{6\frac{1}{2}} - 28117_{7\frac{1}{2}}$	5	4846.943	15	*MB*	20625.798	$2641°_{3\frac{1}{2}} - 23267_{3\frac{1}{2}}$	7
4801.071	2	*MB*	20822.865	$7522°_{0\frac{1}{2}} - 28345_{0\frac{1}{2}}$	8	4847.914	50	*MB*	20621.667	$7713°_{4\frac{1}{2}} - 28334_{4\frac{1}{2}}$	0

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4848.266	20	MB	20620.170	$8423_{6\,1/2} - 29043^{\circ}_{6\,1/2}$	−11	4887.274	1	MB	20455.591	$7059^{\circ}_{4\,1/2} - 27514_{3\,1/2}$	4
4850.216	40	MB	20611.880	$11325^{\circ}_{2\,1/2} - 31937_{3\,1/2}$	8	4888.446	3	MB	20450.687	$4910^{\circ}_{3\,1/2} - 25361_{4\,1/2}$	−23
4850.688	30	MB	20609.874	$7202^{\circ}_{2\,1/2} - 27812_{2\,1/2}$	6	4888.639	10	MB	20449.880	$3703^{\circ}_{3\,1/2} - 24153_{3\,1/2}$	8
4850.901	25	MB	20608.969	$7202^{\circ}_{2\,1/2} - 27811_{3\,1/2}$	3	4890.345	15	MB	20442.746	$9723^{\circ}_{4\,1/2} - 30166_{3\,1/2}$	24
4852.376	10	MB	20602.705	$12260^{\circ}_{3\,1/2} - 32862_{3\,1/2}$	26	4890.426	7	MB	20442.407	$18393_{3\,1/2} - 38835^{\circ}_{2\,1/2}$	1
4853.697	10	MB	20597.097	$11340^{\circ}_{3\,1/2} - 31937_{3\,1/2}$	43	4890.928	2	MB	20440.309	$6913^{\circ}_{6\,1/2} - 27353_{7\,1/2}$	32
4856.690	2	MB	20584.404	$7713^{\circ}_{4\,1/2} - 28297_{3\,1/2}$	21					$11325^{\circ}_{2\,1/2} - 31766_{1\,1/2}$	−18
4857.421	8	MB	20581.307	$4910^{\circ}_{5\,1/2} - 25492_{5\,1/2}$	19	4891.272	20	MB	20438.872	$14481^{\circ}_{2\,1/2} - 34920_{3\,1/2}$	14
4857.978	10	MB	20578.947	$8702^{\circ}_{1\,1/2} - 29281_{2\,1/2}$	17	4891.872	30	MB	20436.365	$12365^{\circ}_{4\,1/2} - 32802_{5\,1/2}$	6
4858.269	12	MB				4893.953	150	MB	20427.675	$10703_{4\,1/2} - 31130^{\circ}_{3\,1/2}$	−2
4858.725	60	MB	20575.783	$9316_{3\,1/2} - 29892^{\circ}_{3\,1/2}$	19	4894.868	9	MB			
4859.042	5	MB	20574.441	$13758^{\circ}_{1\,1/2} - 34333_{2\,1/2}$	13	4895.555	20	MB	20420.991	$7011_{4\,1/2} - 27432^{\circ}_{4\,1/2}$	13
4859.564	15	MB	20572.231	$15565^{\circ}_{2\,1/2} - 36137_{2\,1/2}$	47	4895.992	12	MB	20419.168	$7878^{\circ}_{3\,1/2} - 28297_{3\,1/2}$	23
4859.935	8	MB	20570.660	$14727_{1\,1/2} - 35298^{\circ}_{2\,1/2}$	11	4896.149	5	MB	20418.513	$9316_{3\,1/2} - 29735^{\circ}_{4\,1/2}$	12
4860.911	2	MB	20566.530	$10641^{\circ}_{2\,1/2} - 31207_{3\,1/2}$	45	4897.809	15	MB	20411.593	$9723^{\circ}_{4\,1/2} - 30134_{5\,1/2}$	18
4861.120	5	MB	20565.646	$2634^{\circ}_{2\,1/2} - 23200_{2\,1/2}$	−18	4897.961	10	MB	20410.959	$6967_{6\,1/2} - 27378^{\circ}_{5\,1/2}$	−8
4861.820	7	MB	20562.685	$5118^{\circ}_{2\,1/2} - 25681_{1\,1/2}$	3	4898.338	15	MB	20409.388	$10798^{\circ}_{2\,1/2} - 31207_{3\,1/2}$	17
4862.559	20	MB	20559.560	$26900_{3\,1/2} - 47459^{\circ}_{2\,1/2}$	20	4898.835	5	MB	20407.318	$13758^{\circ}_{1\,1/2} - 34166_{1\,1/2}$	−50
				$3593^{\circ}_{4\,1/2} - 24153_{3\,1/2}$	−23	4899.447	5	MB	20404.769	$8280^{\circ}_{2\,1/2} - 28685_{2\,1/2}$	−42
4863.324	10	MB	20556.326	$7278^{\circ}_{1\,1/2} - 27835_{1\,1/2}$	15	4900.239	15	MB	20401.471	$14625_{5\,1/2} - 35026^{\circ}_{4\,1/2}$	30
4863.666	15	MB	20554.880	$8175^{\circ}_{2\,1/2} - 28730_{3\,1/2}$	32	4900.962	6	MB	20398.461	$5283^{\circ}_{0\,1/2} - 25681_{1\,1/2}$	3
4863.829	10	MB	20554.192	$10274^{\circ}_{3\,1/2} - 30829_{3\,1/2}$	39	4901.397	15	MB	20396.651	$4266^{\circ}_{3\,1/2} - 24663_{4\,1/2}$	−6
4864.848	1	MB	20549.886	$11387^{\circ}_{3\,1/2} - 31937_{3\,1/2}$	−35	4903.693	15	MB	20387.101	$9778^{\circ}_{2\,1/2} - 30166_{3\,1/2}$	30
4865.163	20	MB	20548.556	$10088^{\circ}_{1\,1/2} - 30637_{2\,1/2}$	39	4904.164	10	MB	20385.143	$13659^{\circ}_{4\,1/2} - 34044_{4\,1/2}$	31
4865.612	8	MB	20546.660	$15565^{\circ}_{2\,1/2} - 36112_{3\,1/2}$	59	4904.744	30	MB	20382.732	$6517^{\circ}_{2\,1/2} - 26900_{3\,1/2}$	−2
4866.424	25	MB	20543.231	$11387^{\circ}_{3\,1/2} - 31930_{4\,1/2}$	27	4908.053	20	MB	20368.991	$11949^{\circ}_{3\,1/2} - 32318_{3\,1/2}$	5
4867.063	12	MB	20540.534	$13012^{\circ}_{2\,1/2} - 33552_{2\,1/2}$	48	4908.634	12	MB	20366.580	$8896_{5\,1/2} - 29263^{\circ}_{5\,1/2}$	−28
4868.571	15	MB	20534.172	$12762^{\circ}_{4\,1/2} - 33296_{4\,1/2}$	8	4909.901	20	MB	20361.324	$11007^{\circ}_{1\,1/2} - 31369_{2\,1/2}$	31
4869.745	8	MB	20529.222	$10641^{\circ}_{2\,1/2} - 31170_{1\,1/2}$	19	4910.165	3	MB	20360.230	$15565^{\circ}_{2\,1/2} - 35925_{3\,1/2}$	−31
4869.904	1	MB	20528.552	$13515^{\circ}_{3\,1/2} - 34044_{4\,1/2}$	−35	4911.303	10	MB	20355.512	$10314_{4\,1/2} - 30669^{\circ}_{4\,1/2}$	−27
4870.894	12	MB	20524.379	$10820_{2\,1/2} - 31344^{\circ}_{3\,1/2}$	38	4914.603	15	MB	20341.844	$9723^{\circ}_{4\,1/2} - 30065_{3\,1/2}$	15
4872.230	12	MB	20518.751	$12097_{3\,1/2} - 32616^{\circ}_{4\,1/2}$	9	4914.929	80	MB	20340.495	$7092_{5\,1/2} - 27432^{\circ}_{4\,1/2}$	−21
4873.108	4	MB	20515.055	$4844^{\circ}_{1\,1/2} - 25359_{2\,1/2}$	13	4915.838	10	MB	20336.734	$10088^{\circ}_{1\,1/2} - 30425_{2\,1/2}$	25
4873.993	100	MB	20511.330	$8927^{\circ}_{5\,1/2} - 29438_{5\,1/2}$	27	4917.941	8	MB	20328.038	$8402^{\circ}_{3\,1/2} - 28730_{3\,1/2}$	−5
4874.208	7	MB	20510.425	$6389^{\circ}_{4\,1/2} - 26900_{3\,1/2}$	13	4918.215	8	MB	20326.905	$8702^{\circ}_{1\,1/2} - 29029_{1\,1/2}$	−3
4877.402	8	MB	20496.994	$12365^{\circ}_{4\,1/2} - 32862_{3\,1/2}$	33	4919.673	12	MB	20320.881	$7059^{\circ}_{4\,1/2} - 27379_{5\,1/2}$	4
4877.490	10	MB	20496.624	$4322^{\circ}_{2\,1/2} - 24819_{3\,1/2}$	−1	4920.445	4	MB	20317.693	$13217_{3\,1/2} - 33535^{\circ}_{3\,1/2}$	33
4877.747	10	MB	20495.544	$17475^{\circ}_{4\,1/2} - 37970_{5\,1/2}$	35	4920.654	7	MB	20316.830	$12762^{\circ}_{4\,1/2} - 33079_{3\,1/2}$	−40
4878.170	10	MB	20493.767	$19982_{4\,1/2} - 40475^{\circ}_{3\,1/2}$	29	4921.647	4	MB	20312.731	$7522^{\circ}_{0\,1/2} - 27835_{1\,1/2}$	−43
4878.452	6	MB	20492.582	$9491^{\circ}_{0\,1/2} - 29984_{1\,1/2}$	23	4921.788	10	MB	20312.149	$7202^{\circ}_{2\,1/2} - 27514_{3\,1/2}$	18
4879.230	5	MB	20489.315	$8774_{4\,1/2} - 29263^{\circ}_{5\,1/2}$	41	4922.216	10	MB	20310.383	$10114^{\circ}_{2\,1/2} - 30425_{2\,1/2}$	−82
4882.457	300	MB	20475.773	$12326^{\circ}_{6\,1/2} - 32802_{5\,1/2}$	25	4922.719	6	MB	20308.307	$2595^{\circ}_{1\,1/2} - 22903_{1\,1/2}$	−22
4883.692	12	MB	20470.595	$14827_{3\,1/2} - 35298^{\circ}_{2\,1/2}$	28	4922.768	4	MB	20308.105	$4511^{\circ}_{2\,1/2} - 24819_{3\,1/2}$	28
4884.661	10	MB	20466.534	$6913^{\circ}_{6\,1/2} - 27379_{5\,1/2}$	−22	4925.569	2	MB	20296.557	$6521^{\circ}_{1\,1/2} - 26817_{2\,1/2}$	−46
4885.232	15	MB	20464.142	$11949^{\circ}_{3\,1/2} - 32413_{3\,1/2}$	−14	4928.090	40	MB	20286.174	$9778^{\circ}_{2\,1/2} - 30065_{3\,1/2}$	−3
4885.337	6	MB	20463.702	$11387^{\circ}_{3\,1/2} - 31851_{2\,1/2}$	36	4928.856	12	MB	20283.021	$10924^{\circ}_{4\,1/2} - 31207_{3\,1/2}$	−29
4885.407	2	MB	20463.409			4929.108	4	MB	20281.985	$10869_{4\,1/2} - 31151^{\circ}_{5\,1/2}$	−7
4885.916	8	MB	20461.277	$13515^{\circ}_{3\,1/2} - 33977_{3\,1/2}$	−9	4930.300	5	MB	20277.081	$10684^{\circ}_{0\,1/2} - 30961_{1\,1/2}$	4
4886.340	1	MB	20459.502	$7878^{\circ}_{3\,1/2} - 28337_{2\,1/2}$	16	4932.109	10	MB	20269.644	$5675^{\circ}_{4\,1/2} - 25945_{3\,1/2}$	11
4887.074	8	MB	20456.429	$7878^{\circ}_{3\,1/2} - 28334_{4\,1/2}$	1	4934.194	4	MB	20261.079	$12057^{\circ}_{2\,1/2} - 32318_{3\,1/2}$	11

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
4936.247	15	*MB*	20252.652	$5513_{5\frac{1}{2}} - 25766°_{4\frac{1}{2}}$	6	4978.201	8	*MB*	20081.974	$4737°_{2\frac{1}{2}} - 24819_{3\frac{1}{2}}$	14
4936.486	6	*MB*	20251.672			4978.840	3	*MB*	20079.397	$3703°_{3\frac{1}{2}} - 23782_{2\frac{1}{2}}$	3
4937.182	12	*MB*	20248.817	$11949°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	24	4981.817	4	*MB*	20067.398	$13012°_{2\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−18
4938.220	2	*MB*	20244.561	$10798°_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	6	4983.008	6	*MB*	20062.602	$15235_{1\frac{1}{2}} - 35298°_{2\frac{1}{2}}$	−8
4939.559	8	*MB*	20239.073	$8927°_{5\frac{1}{2}} - 29166_{4\frac{1}{2}}$	−9	4983.439	8	*MB*	20060.867	$10684°_{0\frac{1}{2}} - 30745_{1\frac{1}{2}}$	22
4939.867	8	*MB*	20237.811	$7713°_{4\frac{1}{2}} - 27950_{5\frac{1}{2}}$	11	4983.727	4	*MB*	20059.708	$7293°_{6\frac{1}{2}} - 27353_{7\frac{1}{2}}$	−23
4940.303	8	*MB*	20236.025	$14625_{5\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	2	4984.133	5	*MB*	20058.074	$12260°_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−12
4941.066	10	*MB*	20232.900	$11325°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	56	4984.428	80	*MB*	20056.887	$8280°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	19
4942.408	7	*MB*	20227.406	$11340°_{3\frac{1}{2}} - 31568_{4\frac{1}{2}}$	−14	4984.572	30	*MB*	20056.307	$7878°_{3\frac{1}{2}} - 27934_{4\frac{1}{2}}$	−2
4943.442	250	*MB*	20223.176	$9725_{3\frac{1}{2}} - 29948°_{2\frac{1}{2}}$	−4	4986.046	7	*MB*	20050.378	$12751°_{5\frac{1}{2}} - 32802_{5\frac{1}{2}}$	−4
4943.838	60	*MB*	20221.556	$7713°_{4\frac{1}{2}} - 27934_{4\frac{1}{2}}$	7	4986.386	100	*MB*	20049.011	$8278_{5\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	−5
4944.614	200	*MB*	20218.382	$8131_{4\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	17	4986.962	8	*MB*	20046.695	$3593°_{4\frac{1}{2}} - 23640_{4\frac{1}{2}}$	15
4946.622	15	*MB*	20210.175	$10035°_{5\frac{1}{2}} - 30245_{4\frac{1}{2}}$	8	4987.793	8	*MB*	20043.355	$11325°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	44
4947.874	7	*MB*	20205.061	$9778°_{2\frac{1}{2}} - 29984_{1\frac{1}{2}}$	−4	4988.159	5	*MB*	20041.885		
4948.242	5	*MB*	20203.559	$10820_{2\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	−30	4988.414	15	*MB*	20040.860	$4459°_{3\frac{1}{2}} - 24500_{2\frac{1}{2}}$	−23
4948.339	2	*MB*	20203.163	$4459°_{3\frac{1}{2}} - 24663_{4\frac{1}{2}}$	−19	4989.252	10	*MB*	20037.494	$7341_{5\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	−13
				$6638°_{4\frac{1}{2}} - 26841_{4\frac{1}{2}}$	37					$3745°_{1\frac{1}{2}} - 23782_{2\frac{1}{2}}$	−21
4949.528	80	*MB*	20198.309	$15517°_{6\frac{1}{2}} - 35716_{5\frac{1}{2}}$	−1	4989.789	1	*MB*	20035.338	$11007°_{1\frac{1}{2}} - 31043_{2\frac{1}{2}}$	27
4951.674	10	*MB*	20189.556	$11949°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	47	4990.402	4	*MB*	20032.877		
4951.894	5	*MB*	20188.659	$11742°_{5\frac{1}{2}} - 31930_{4\frac{1}{2}}$	−31	4991.013	100	*MB*	20030.424	$11309_{7\frac{1}{2}} - 31340°_{6\frac{1}{2}}$	4
4952.132	4	*MB*	20187.688	$10641°_{2\frac{1}{2}} - 30829_{3\frac{1}{2}}$	7	4991.591	12	*MB*	20028.105	$9778°_{2\frac{1}{2}} - 29807_{3\frac{1}{2}}$	13
4953.310	8	*MB*	20182.888	$10454°_{1\frac{1}{2}} - 30637_{2\frac{1}{2}}$	3	4991.915	3	*MB*	20026.805	$7878°_{3\frac{1}{2}} - 27905_{4\frac{1}{2}}$	−23
4954.506	2	*MB*	20178.016	$4322°_{2\frac{1}{2}} - 24500_{2\frac{1}{2}}$	−31	4992.746	7	*MB*	20023.472	$13784°_{1\frac{1}{2}} - 33808_{2\frac{1}{2}}$	−10
4956.257	15	*MB*	20170.887	$11387°_{3\frac{1}{2}} - 31558_{3\frac{1}{2}}$	−7	4994.024	2	*MB*	20018.348		
4956.938	10	*MB*	20168.116	$8169°_{1\frac{1}{2}} - 28337_{2\frac{1}{2}}$	0	4994.477	50	*MB*	20016.532	$8280°_{2\frac{1}{2}} - 28297_{3\frac{1}{2}}$	5
4957.225	2	*MB*	20166.948	$9725_{3\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	4	4994.724	50	*MB*	20015.542	$9778°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	12
4957.561	2	*MB*	20165.581	$12326°_{6\frac{1}{2}} - 32492_{5\frac{1}{2}}$	−39	4997.958	5	*MB*	20002.591	$5942°_{3\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−6
4958.455	15	*MB*	20161.946	$8175°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−4	4998.446	20	*MB*	20000.638	$13659°_{4\frac{1}{2}} - 33659_{5\frac{1}{2}}$	0
4959.419	8	*MB*	20158.027	$3995°_{3\frac{1}{2}} - 24153_{3\frac{1}{2}}$	21	4999.677	1	*MB*	19995.714	$10641°_{2\frac{1}{2}} - 30637_{2\frac{1}{2}}$	0
4959.598	5	*MB*	20157.299	$13436_{2\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	1	5000.298	4	*MB*	19993.231	$13117_{4\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	−9
4960.601	4	*MB*	20153.223	$12260°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−34	5000.958	12	*MB*	19990.592	$7259°_{3\frac{1}{2}} - 27249_{2\frac{1}{2}}$	−1
4960.847	50	*MB*	20152.224	$13659°_{4\frac{1}{2}} - 33811_{4\frac{1}{2}}$	−13	5001.238	8	*MB*	19989.473	$4511°_{2\frac{1}{2}} - 24500_{2\frac{1}{2}}$	−25
4961.501	40	*MB*	20149.568	$5616_{4\frac{1}{2}} - 25766°_{4\frac{1}{2}}$	−47	5002.478	8	*MB*	19984.518	$7202°_{2\frac{1}{2}} - 27187_{3\frac{1}{2}}$	0
4962.101	10	*MB*	20147.131	$8896_{5\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	7	5002.778	50	*MB*	19983.320	$8702°_{1\frac{1}{2}} - 28685_{2\frac{1}{2}}$	6
4962.776	12	*MB*	20144.391	$10035°_{5\frac{1}{2}} - 30180_{6\frac{1}{2}}$	6	5003.167	8	*MB*	19981.766	$11949°_{3\frac{1}{2}} - 31930_{4\frac{1}{2}}$	19
4964.354	5	*MB*	20137.988	$12097_{3\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	25	5003.470	15	*MB*	19980.556	$2595°_{1\frac{1}{2}} - 22576_{2\frac{1}{2}}$	30
4967.250	12	*MB*	20126.247	$12365°_{4\frac{1}{2}} - 32492_{5\frac{1}{2}}$	16	5004.089	7	*MB*	19978.084	$16159°_{3\frac{1}{2}} - 36137_{2\frac{1}{2}}$	17
				$5819°_{4\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−35	5005.861	15	*MB*	19971.012	$10454°_{1\frac{1}{2}} - 30425_{2\frac{1}{2}}$	−64
4968.396	50	*MB*	20121.605	$8175°_{2\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−4	5007.161	2	*MB*	19965.827	$14963°_{5\frac{1}{2}} - 34928_{4\frac{1}{2}}$	−41
4970.412	60	*MB*	20113.444	$17475°_{4\frac{1}{2}} - 37588_{3\frac{1}{2}}$	−5	5010.523	6	*MB*	19952.431	$16159°_{3\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−53
4970.906	10	*MB*	20111.445	$25753_{6\frac{1}{2}} - 45864°_{5\frac{1}{2}}$	−11	5011.760	200	*MB*	19947.506	$8448_{2\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	−2
4971.497	300	*MB*	20109.054	$14404°_{7\frac{1}{2}} - 34513_{6\frac{1}{2}}$	−13	5014.190	9	*MB*	19937.839	$12260°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	−54
4972.871	1	*MB*	20103.498			5015.140	10	*MB*	19934.063	$7878°_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−6
4973.215	15	*MB*	20102.108	$5651°_{5\frac{1}{2}} - 25753_{6\frac{1}{2}}$	−27	5015.365	7	*MB*	19933.168	$7878°_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	1
4973.706	1	*MB*	20100.123	$12762°_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−2	5016.165	4	*MB*	19929.989	$6549°_{2\frac{1}{2}} - 26479_{1\frac{1}{2}}$	−23
4976.455	7	*MB*	20089.020	$7746°_{2\frac{1}{2}} - 27835_{1\frac{1}{2}}$	−27	5017.045	30	*MB*	19926.494	$8804°_{4\frac{1}{2}} - 28730_{3\frac{1}{2}}$	6
4976.567	6	*MB*	20088.568	$5010°_{2\frac{1}{2}} - 25099_{1\frac{1}{2}}$	−43	5018.446	7	*MB*	19920.931	$8804°_{4\frac{1}{2}} - 28725_{4\frac{1}{2}}$	7
4977.197	80	*MB*	20086.025	$7293°_{6\frac{1}{2}} - 27379_{5\frac{1}{2}}$	14	5019.073	7	*MB*	19918.442	$13675_{2\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	13
4977.770	8	*MB*	20083.713	$9723°_{4\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−29	5022.363	10	*MB*	19905.395	$10088°_{1\frac{1}{2}} - 29994_{2\frac{1}{2}}$	−5
4977.933	12	*MB*	20083.056	$9198°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	8	5022.647	8	*MB*	19904.269	$10924°_{4\frac{1}{2}} - 30829_{3\frac{1}{2}}$	21

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
5022.869	250	*MB*	19903.389	$8423_{6\,1/2} - 28327^{\circ}_{5\,1/2}$	−9	5075.541	30	*MB*	19696.842	$11454_{6\,1/2} - 31151^{\circ}_{5\,1/2}$	9
5023.482	10	*MB*	19900.961	$8448_{2\,1/2} - 28349^{\circ}_{3\,1/2}$	20	5076.483	150	*MB*	19693.187	$11458_{5\,1/2} - 31151^{\circ}_{5\,1/2}$	7
5024.785	7	*MB*	19895.800	$17300^{\circ}_{3\,1/2} - 37196_{4\,1/2}$	−28	5076.712	30	*MB*	19692.299	$10058_{6\,1/2} - 29750^{\circ}_{5\,1/2}$	−21
5025.049	8	*MB*	19894.755	$9778^{\circ}_{2\,1/2} - 29673_{2\,1/2}$	−28	5077.206	6	*MB*	19690.383	$25753_{6\,1/2} - 45443^{\circ}_{7\,1/2}$	16
5025.226	15	*MB*	19894.054	$13515^{\circ}_{3\,1/2} - 33409_{3\,1/2}$	10	5077.851	80	*MB*	19687.882	$11387^{\circ}_{3\,1/2} - 31075_{4\,1/2}$	10
5025.443	20	*MB*	19893.195	$13217_{3\,1/2} - 33111^{\circ}_{3\,1/2}$	8	5078.355	25	*MB*	19685.928	$32372^{\circ}_{4\,1/2} - 52058_{4\,1/2}$	−37
5025.974	12	*MB*	19891.093	$10274^{\circ}_{3\,1/2} - 30166_{3\,1/2}$	8					$5675^{\circ}_{4\,1/2} - 25361_{4\,1/2}$	17
5026.998	7	*MB*	19887.042	$4266^{\circ}_{3\,1/2} - 24153_{3\,1/2}$	−26	5078.822	2	*MB*	19684.118	$14481^{\circ}_{2\,1/2} - 34166_{1\,1/2}$	9
5027.340	40	*MB*	19885.689	$11454_{6\,1/2} - 31340^{\circ}_{6\,1/2}$	−2	5079.678	1000	*MB*	19680.801	$11165_{8\,1/2} - 30846^{\circ}_{7\,1/2}$	15
5028.269	30b	*MB*	19882.015	$11458_{5\,1/2} - 31340^{\circ}_{6\,1/2}$	−24	5079.975	6	*MB*	19679.650	$10114^{\circ}_{2\,1/2} - 29794_{3\,1/2}$	17
5030.980	30	*MB*	19871.301	$13117_{4\,1/2} - 32989^{\circ}_{3\,1/2}$	6	5081.349	8	*MB*	19674.329	$13436_{2\,1/2} - 33111^{\circ}_{3\,1/2}$	20
5031.445	5	*MB*	19869.465	$12097_{3\,1/2} - 31966^{\circ}_{2\,1/2}$	−6	5081.648	7	*MB*	19673.171	$5819^{\circ}_{4\,1/2} - 25492_{5\,1/2}$	34
5032.002	60	*MB*	19867.265	$11340^{\circ}_{3\,1/2} - 31207_{3\,1/2}$	−63	5082.244	10	*MB*	19670.864	$12260^{\circ}_{3\,1/2} - 31930_{4\,1/2}$	16
5032.958	4	*MB*	19863.492	$15434_{2\,1/2} - 35298^{\circ}_{2\,1/2}$	1	5083.162	8	*MB*	19667.312	$13217_{3\,1/2} - 32885^{\circ}_{2\,1/2}$	−78
5036.082	3	*MB*	19851.170	$14481^{\circ}_{2\,1/2} - 34333_{2\,1/2}$	2	5083.275	12	*MB*	19666.875	$7713^{\circ}_{4\,1/2} - 27379_{5\,1/2}$	15
5036.205	3	*MB*	19850.685	$13012^{\circ}_{2\,1/2} - 32862_{3\,1/2}$	13	5086.089	6	*MB*	19655.994	$14252_{3\,1/2} - 33908^{\circ}_{4\,1/2}$	−20
5036.351	2	*MB*	19850.110	$14315^{\circ}_{0\,1/2} - 34166_{1\,1/2}$	3	5086.185	7	*MB*	19655.623	$2634^{\circ}_{2\,1/2} - 22290_{1\,1/2}$	−25
5037.787	250	*MB*	19844.452	$8131_{4\,1/2} - 27975^{\circ}_{4\,1/2}$	50	5086.577	12	*MB*	19654.108	$11015_{3\,1/2} - 30669^{\circ}_{4\,1/2}$	−14
5039.269	10	*MB*	19838.616	$10798^{\circ}_{2\,1/2} - 30637_{2\,1/2}$	14	5087.462	5	*MB*	19650.689	$12762^{\circ}_{4\,1/2} - 32413_{3\,1/2}$	−15
5039.800	80b	*MB*	19836.526	$13027_{6\,1/2} - 32864^{\circ}_{5\,1/2}$	6	5089.490	12	*MB*	19642.859	$8702^{\circ}_{1\,1/2} - 28345_{0\,1/2}$	−9
5041.381	15	*MB*	19830.305	$8804^{\circ}_{4\,1/2} - 28634_{5\,1/2}$	13	5089.881	1	*MB*	19641.350	$9723^{\circ}_{4\,1/2} - 29364_{3\,1/2}$	−54
5042.537	10	*MB*	19825.759	$11742^{\circ}_{5\,1/2} - 31568_{4\,1/2}$	−14	5090.878	40	*MB*	19637.503	$13659^{\circ}_{4\,1/2} - 33296_{4\,1/2}$	28
5044.023	400	*MB*	19819.918	$9771_{7\,1/2} - 29591^{\circ}_{6\,1/2}$	1	5091.182	5	*MB*	19636.331	$7878^{\circ}_{3\,1/2} - 27514_{3\,1/2}$	0
5044.547	10	*MB*	19817.859	$8531_{3\,1/2} - 28349^{\circ}_{3\,1/2}$	−44	5092.334	2	*MB*	19631.889	$14276_{5\,1/2} - 33908^{\circ}_{4\,1/2}$	−5
5044.915	1	*MB*	19816.414	$5283^{\circ}_{0\,1/2} - 25099_{1\,1/2}$	−38	5092.706	2	*MB*	19630.455	$4523^{\circ}_{4\,1/2} - 24153_{3\,1/2}$	22
5045.126	7	*MB*	19815.585	$9634^{\circ}_{1\,1/2} - 29449_{1\,1/2}$	−6	5093.168	8	*MB*	19628.674	$13256_{1\,1/2} - 32885^{\circ}_{2\,1/2}$	8
5046.942	8	*MB*	19808.455	$5010^{\circ}_{2\,1/2} - 24819_{3\,1/2}$	−8	5093.645	20	*MB*	19626.836	$10798^{\circ}_{2\,1/2} - 30425_{2\,1/2}$	42
5048.175	2	*MB*	19803.617	$15822_{3\,1/2} - 35625^{\circ}_{3\,1/2}$	−23	5094.520	1	*MB*	19623.465	$17300^{\circ}_{3\,1/2} - 36923_{4\,1/2}$	−13
5049.061	5	*MB*	19800.142	$10869_{4\,1/2} - 30669^{\circ}_{4\,1/2}$	−18	5095.726	10	*MB*	19618.821	$11949^{\circ}_{3\,1/2} - 31568_{4\,1/2}$	−8
5049.708	7	*MB*	19797.605	$8927^{\circ}_{5\,1/2} - 28725_{4\,1/2}$	−28	5096.163	4	*MB*	19617.138	$13268_{2\,1/2} - 32885^{\circ}_{2\,1/2}$	−10
5050.555	10	*MB*	19794.285	$12057^{\circ}_{2\,1/2} - 31851_{2\,1/2}$	−4	5096.698	2	*MB*	19615.079	$16192^{\circ}_{4\,1/2} - 35807_{4\,1/2}$	−22
5053.055	10	*MB*	19784.492	$5969^{\circ}_{5\,1/2} - 25753_{6\,1/2}$	7	5098.186	2	*MB*	19609.354	$11949^{\circ}_{3\,1/2} - 31558_{3\,1/2}$	−82
5054.593	2	*MB*	19778.472	$12456_{3\,1/2} - 32235^{\circ}_{3\,1/2}$	−20	5098.614	3	*MB*	19607.708	$7233^{\circ}_{5\,1/2} - 26841_{4\,1/2}$	−48
5054.795	3	*MB*	19777.681	$10924^{\circ}_{4\,1/2} - 30702_{4\,1/2}$	−52	5102.983	2	*MB*	19590.921		
5057.379	5	*MB*	19767.577			5104.337	12	*MB*	19585.724	$9778^{\circ}_{2\,1/2} - 29364_{3\,1/2}$	−29
5057.694	15	*MB*	19766.345	$15859_{4\,1/2} - 35625^{\circ}_{3\,1/2}$	9	5105.231	40	*MB*	19582.295	$7259^{\circ}_{3\,1/2} - 26841_{4\,1/2}$	−13
5059.438	20	*MB*	19759.532	$9269^{\circ}_{0\,1/2} - 29029_{1\,1/2}$	5	5105.556	12	*MB*	19581.048	$4201^{\circ}_{1\,1/2} - 23782_{2\,1/2}$	−49
5061.355	6	*MB*	19752.048	$4910^{\circ}_{5\,1/2} - 24663_{4\,1/2}$	−43	5105.852	15	*MB*	19579.913	$15281_{6\,1/2} - 34861^{\circ}_{5\,1/2}$	−10
5062.809	4	*MB*	19746.375	$13117_{4\,1/2} - 32864^{\circ}_{5\,1/2}$	20	5106.223	8	*MB*	19578.490	$10314_{4\,1/2} - 29892^{\circ}_{3\,1/2}$	−24
5063.564	2	*MB*				5107.951	8	*MB*	19571.867	$12365^{\circ}_{4\,1/2} - 31937_{3\,1/2}$	20
5065.725	20	*MB*	19735.009	$11340^{\circ}_{3\,1/2} - 31075_{4\,1/2}$	4	5110.096	4	*MB*	19563.652	$13515^{\circ}_{3\,1/2} - 33079_{3\,1/2}$	−6
5067.165	60	*MB*	19729.401	$12762^{\circ}_{4\,1/2} - 32492_{5\,1/2}$	4	5110.925	1	*MB*	19560.479	$14315^{\circ}_{0\,1/2} - 33876_{1\,1/2}$	34
5067.658	2	*MB*	19727.481	$15134_{4\,1/2} - 34861^{\circ}_{5\,1/2}$	5	5112.232	8	*MB*	19555.478	$6389^{\circ}_{4\,1/2} - 25945_{3\,1/2}$	24
5069.302	10	*MB*	19721.084	$17475^{\circ}_{4\,1/2} - 37196_{4\,1/2}$	−31	5112.543	15	*MB*	19554.288	$8280^{\circ}_{2\,1/2} - 27835_{1\,1/2}$	1
5070.271	2	*MB*	19717.315	$11325^{\circ}_{2\,1/2} - 31043_{2\,1/2}$	−13	5115.138	15	*MB*	19544.368	$14049_{1\,1/2} - 33594^{\circ}_{2\,1/2}$	−22
5072.073	7	*MB*	19710.310	$5651^{\circ}_{5\,1/2} - 25361_{4\,1/2}$	−6	5116.329	10	*MB*	19539.819	$10454^{\circ}_{1\,1/2} - 29994_{2\,1/2}$	50
5072.408	2	*MB*	19709.008	$12057^{\circ}_{2\,1/2} - 31766_{1\,1/2}$	6	5116.537	3	*MB*	19539.024	$7278^{\circ}_{1\,1/2} - 26817_{2\,1/2}$	11
5072.921	20	*MB*	19707.015	$8927^{\circ}_{5\,1/2} - 28634_{5\,1/2}$	13	5117.168	300	*MB*	19536.615	$11309_{7\,1/2} - 30846^{\circ}_{7\,1/2}$	5
5074.594	30	*MB*	19700.518	$5118^{\circ}_{2\,1/2} - 24819_{3\,1/2}$	−9	5117.948	40	*MB*	19533.637	$10058_{6\,1/2} - 29591^{\circ}_{6\,1/2}$	−9
5075.353	500	*MB*	19697.572	$8278_{5\,1/2} - 27975^{\circ}_{4\,1/2}$	7	5118.347	12	*MB*	19532.115	$10274^{\circ}_{3\,1/2} - 29807_{3\,1/2}$	8

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
5118.758	10	*MB*	19530.546	$8280°_{2\frac{1}{2}}-27811_{3\frac{1}{2}}$	−3	5182.584	2	*MB*	19290.021	$7061°_{0\frac{1}{2}}-26351_{0\frac{1}{2}}$	−51
				$1410°_{4\frac{1}{2}}-20940_{3\frac{1}{2}}$	12	5183.743	20	*MB*	19285.709	$11949°_{3\frac{1}{2}}-31234_{2\frac{1}{2}}$	20
5119.730	15	*MB*	19526.839	$9198°_{3\frac{1}{2}}-28725_{4\frac{1}{2}}$	17	5187.459	800b	*MB*	19271.894	$9771_{7\frac{1}{2}}-29043°_{6\frac{1}{2}}$	−3
5121.649	2	*MB*	19519.522	$10274°_{3\frac{1}{2}}-29794_{3\frac{1}{2}}$	−23					$3995°_{3\frac{1}{2}}-23267_{3\frac{1}{2}}$	3
5122.894	4	*MB*	19514.779			5190.604	3	*MB*	19260.217	$13784°_{1\frac{1}{2}}-33045_{2\frac{1}{2}}$	−43
5122.997	1	*MB*				5191.634	300	*MB*	19256.396	$7011_{4\frac{1}{2}}-26268°_{3\frac{1}{2}}$	−2
5124.138	10	*MB*	19510.041	$27187_{3\frac{1}{2}}-46697°_{4\frac{1}{2}}$	4	5192.094	10	*MB*	19254.690	$13117_{4\frac{1}{2}}-32372°_{4\frac{1}{2}}$	−8
5125.877	8	*MB*	19503.422	$7746°_{2\frac{1}{2}}-27249_{2\frac{1}{2}}$	−61	5194.072	12	*MB*	19247.357	$8131_{4\frac{1}{2}}-27378°_{5\frac{1}{2}}$	59
5126.156	10	*MB*	19502.361	$9778°_{2\frac{1}{2}}-29281_{2\frac{1}{2}}$	−26	5195.241	2	*MB*	19243.026		
5128.749	8	*MB*	19492.501	$16133_{2\frac{1}{2}}-35625°_{3\frac{1}{2}}$	−4	5195.747	5	*MB*	19241.152	$10924°_{4\frac{1}{2}}-30166_{3\frac{1}{2}}$	−28
5129.794	4	*MB*	19488.530	$11340°_{3\frac{1}{2}}-30829_{3\frac{1}{2}}$	4	5197.049	2	*MB*	19236.332		
5131.187	6	*MB*	19483.239	$0°_{3\frac{1}{2}}-19483_{2\frac{1}{2}}$	14	5197.757	12	*MB*	19233.712	$8280°_{2\frac{1}{2}}-27514_{3\frac{1}{2}}$	−1
5133.071	1	*MB*	19476.088	$15822_{3\frac{1}{2}}-35298°_{2\frac{1}{2}}$	−42	5203.616	15	*MB*	19212.056		
5133.801	3	*MB*	19473.319	$16152_{3\frac{1}{2}}-35625°_{3\frac{1}{2}}$	−3	5205.506	80	*MB*	19205.081	$10058_{6\frac{1}{2}}-29263°_{5\frac{1}{2}}$	−30
5136.795	5	*MB*	19461.969	$13527_{4\frac{1}{2}}-32989°_{3\frac{1}{2}}$	−9	5205.960	5	*MB*	19203.406	$13659°_{4\frac{1}{2}}-32862_{3\frac{1}{2}}$	−31
5138.668	5	*MB*	19454.876	$3745°_{1\frac{1}{2}}-23200_{2\frac{1}{2}}$	20	5206.600	4	*MB*	19201.045	$7278°_{1\frac{1}{2}}-26479_{1\frac{1}{2}}$	42
5141.745	8	*MB*	19443.233	$9723°_{4\frac{1}{2}}-29166_{4\frac{1}{2}}$	−28	5208.108	4	*MB*	19195.486	$10798°_{2\frac{1}{2}}-29994_{2\frac{1}{2}}$	0
5142.214	12	*MB*	19441.460	$18147°_{2\frac{1}{2}}-37588_{3\frac{1}{2}}$	−7	5210.340	60	*MB*	19187.263	$7713°_{4\frac{1}{2}}-26900_{3\frac{1}{2}}$	−1
5142.902	2	*MB*	19438.859			5212.933	2	*MB*	19177.719	$12057°_{2\frac{1}{2}}-31234_{2\frac{1}{2}}$	−52
5143.561	8	*MB*	19436.369	$10314_{4\frac{1}{2}}-29750°_{5\frac{1}{2}}$	−15	5214.719	6	*MB*	19171.151	$16454_{2\frac{1}{2}}-35625°_{3\frac{1}{2}}$	6
5143.828	8	*MB*	19435.360	$12762°_{4\frac{1}{2}}-32197_{4\frac{1}{2}}$	19	5215.692	15	*MB*	19167.574	$15859_{4\frac{1}{2}}-35026°_{4\frac{1}{2}}$	−6
5144.848	20	*MB*	19431.506	$7818°_{1\frac{1}{2}}-27249_{2\frac{1}{2}}$	−15	5216.234	3	*MB*	19165.583	$10641°_{2\frac{1}{2}}-29807_{3\frac{1}{2}}$	−52
5145.162	40	*MB*	19430.321	$8896_{5\frac{1}{2}}-28327°_{5\frac{1}{2}}$	−20	5216.702	15	*MB*	19163.863	$6517°_{2\frac{1}{2}}-25681_{1\frac{1}{2}}$	−5
5146.106	1	*MB*	19426.756			5217.715	12	*MB*	19160.144	$6521°_{1\frac{1}{2}}-25681_{1\frac{1}{2}}$	−12
5146.901	12	*MB*	19423.756	$10641°_{2\frac{1}{2}}-30065_{3\frac{1}{2}}$	34	5218.201	6	*MB*	19158.358		
5147.570	200	*MB*	19421.231	$10314_{4\frac{1}{2}}-29735°_{4\frac{1}{2}}$	−19	5219.221	3	*MB*	19154.614	$13217_{3\frac{1}{2}}-32372°_{4\frac{1}{2}}$	−30
5147.917	7	*MB*	19419.922	$11949°_{3\frac{1}{2}}-31369_{2\frac{1}{2}}$	19	5220.221	12	*MB*	19150.945	$13675_{2\frac{1}{2}}-32826°_{1\frac{1}{2}}$	0
5148.548	30	*MB*	19417.542	$11007°_{1\frac{1}{2}}-30425_{2\frac{1}{2}}$	−7	5220.884	6	*MB*	19148.513	$14387_{4\frac{1}{2}}-33535°_{3\frac{1}{2}}$	−10
5150.628	4	*MB*	19409.701	$8402°_{3\frac{1}{2}}-27812_{2\frac{1}{2}}$	−28	5221.393	8	*MB*	19146.646	$8804°_{4\frac{1}{2}}-27950_{5\frac{1}{2}}$	−20
5150.859	12	*MB*	19408.830	$8402°_{3\frac{1}{2}}-27811_{3\frac{1}{2}}$	3	5222.242	8	*MB*	19143.534	$5675°_{4\frac{1}{2}}-24819_{3\frac{1}{2}}$	−36
5154.402	50	*MB*	19395.490	$3508°_{0\frac{1}{2}}-22903_{1\frac{1}{2}}$	−13	5224.181	2	*MB*	19136.429	$9198°_{3\frac{1}{2}}-28334_{4\frac{1}{2}}$	0
				$6549°_{2\frac{1}{2}}-25945_{3\frac{1}{2}}$	2	5225.202	1	*MB*	19132.689	$28297_{3\frac{1}{2}}-47430°_{3\frac{1}{2}}$	−21
5155.308	5	*MB*	19392.081	$11759_{5\frac{1}{2}}-31151°_{5\frac{1}{2}}$	14	5225.505	25	*MB*	19131.580	$6549°_{2\frac{1}{2}}-25681_{1\frac{1}{2}}$	0
5155.370	10	*MB*	19391.848	$11454_{6\frac{1}{2}}-30846°_{7\frac{1}{2}}$	−32	5226.401	50	*MB*	19128.300	$7713°_{4\frac{1}{2}}-26841_{4\frac{1}{2}}$	5
5157.205	15	*MB*	19384.948	$12466°_{1\frac{1}{2}}-31851_{2\frac{1}{2}}$	−18	5226.910	20	*MB*	19126.437	$11949°_{3\frac{1}{2}}-31075_{4\frac{1}{2}}$	24
5158.031	10	*MB*	19381.844	$5437°_{3\frac{1}{2}}-24819_{3\frac{1}{2}}$	−67	5232.548	5	*MB*	19105.829	$10684°_{0\frac{1}{2}}-29790_{0\frac{1}{2}}$	0
5160.092	1	*MB*	19374.103	$4266°_{3\frac{1}{2}}-23640_{4\frac{1}{2}}$	−62	5232.922	300	*MB*	19104.464	$10646_{5\frac{1}{2}}-29750°_{5\frac{1}{2}}$	−12
5160.831	15	*MB*	19371.328	$7878°_{3\frac{1}{2}}-27249_{2\frac{1}{2}}$	−12	5233.285	4	*MB*	19103.139	$5716°_{3\frac{1}{2}}-24819_{3\frac{1}{2}}$	21
5161.842	8	*MB*	19367.534	$10798°_{2\frac{1}{2}}-30166_{3\frac{1}{2}}$	33	5234.017	120	*MB*	19100.467	$8278_{5\frac{1}{2}}-27378°_{5\frac{1}{2}}$	6
5163.310	25	*MB*	19362.028	$11340°_{3\frac{1}{2}}-30702_{4\frac{1}{2}}$	16	5234.268	6	*MB*	19099.551	$11325°_{2\frac{1}{2}}-30425_{2\frac{1}{2}}$	−16
5163.548	2	*MB*	19361.135	$10088°_{1\frac{1}{2}}-29449_{1\frac{1}{2}}$	−2	5235.800	50	*MB*	19093.962	$11949°_{3\frac{1}{2}}-31043_{2\frac{1}{2}}$	42
5168.669	10	*MB*	19341.953	$14252_{3\frac{1}{2}}-33594°_{2\frac{1}{2}}$	−20	5237.069	100	*MB*	19089.336	$10646_{5\frac{1}{2}}-29735°_{4\frac{1}{2}}$	−6
5170.967	5	*MB*	19333.358	$11742°_{5\frac{1}{2}}-31075_{4\frac{1}{2}}$	0	5237.219	15	*MB*	19088.789	$13527_{4\frac{1}{2}}-32616°_{4\frac{1}{2}}$	9
5173.712	15	*MB*	19323.100	$4459°_{3\frac{1}{2}}-23782_{2\frac{1}{2}}$	−18	5239.271	20	*MB*	19081.313	$14963°_{5\frac{1}{2}}-34044_{4\frac{1}{2}}$	−27
5174.879	4	*MB*	19318.743	$7522°_{5\frac{1}{2}}-26841_{4\frac{1}{2}}$	−19	5239.479	4	*MB*	19080.555	$14827_{3\frac{1}{2}}-33908°_{4\frac{1}{2}}$	−14
5176.864	1	*MB*	19311.335	$11325°_{2\frac{1}{2}}-30637_{2\frac{1}{2}}$	−40	5239.845	25	*MB*	19079.223	$9316_{3\frac{1}{2}}-28396°_{2\frac{1}{2}}$	−14
5177.576	5	*MB*	19308.679	$7878°_{3\frac{1}{2}}-27187_{3\frac{1}{2}}$	−39	5239.937	3	*MB*	19078.888	$8896_{5\frac{1}{2}}-27975°_{4\frac{1}{2}}$	−1
5178.287	4	*MB*	19306.028	$13012°_{2\frac{1}{2}}-32318_{3\frac{1}{2}}$	−51	5241.333	15	*MB*	19073.806	$8175°_{2\frac{1}{2}}-27249_{2\frac{1}{2}}$	0
5179.481	20	*MB*	19301.578	$8131_{4\frac{1}{2}}-27432°_{4\frac{1}{2}}$	13	5241.782	20	*MB*	19072.172	$10820_{2\frac{1}{2}}-29892°_{3\frac{1}{2}}$	−18
5179.917	2	*MB*	19299.953	$10820_{2\frac{1}{2}}-30120°_{1\frac{1}{2}}$	33	5242.210	2	*MB*	19070.615	$14481°_{2\frac{1}{2}}-33552_{2\frac{1}{2}}$	−36

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
5249.915	8	*MB*	19042.627	$12704_{1\frac{1}{2}} - 31747^{\circ}_{1\frac{1}{2}}$	18	5319.953	10	*MB*	18791.931	$27905_{4\frac{1}{2}} - 46697^{\circ}_{4\frac{1}{2}}$	4
5252.107	12	*MB*	19034.679	$5118^{\circ}_{2\frac{1}{2}} - 24153_{3\frac{1}{2}}$	20	5321.159	4	*MB*	18787.672	$14097_{3\frac{1}{2}} - 32885^{\circ}_{2\frac{1}{2}}$	0
5252.381	3	*MB*	19033.686	$12097_{3\frac{1}{2}} - 31130^{\circ}_{3\frac{1}{2}}$	−20	5321.971	2	*MB*	18784.805		
5252.668	150	*MB*	19032.646	$9316_{3\frac{1}{2}} - 28349^{\circ}_{3\frac{1}{2}}$	−23	5322.093	3	*MB*	18784.374	$8402^{\circ}_{3\frac{1}{2}} - 27187_{3\frac{1}{2}}$	−4
5252.808	30	*MB*	19032.139	$10703_{4\frac{1}{2}} - 29735^{\circ}_{4\frac{1}{2}}$	31	5322.482	3	*MB*	18783.002	$12260^{\circ}_{3\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−19
5253.522	10	*MB*	19029.553	$16268_{1\frac{1}{2}} - 35298^{\circ}_{2\frac{1}{2}}$	36	5322.632	1	*MB*	18782.472	$11007^{\circ}_{1\frac{1}{2}} - 29790_{0\frac{1}{2}}$	1
5255.215	6	*MB*	19023.422	$8927^{\circ}_{5\frac{1}{2}} - 27950_{5\frac{1}{2}}$	45	5323.582	10	*MB*	18779.121	$8927^{\circ}_{5\frac{1}{2}} - 27706_{6\frac{1}{2}}$	4
5258.447	60	*MB*	19011.730	$5651^{\circ}_{5\frac{1}{2}} - 24663_{4\frac{1}{2}}$	32	5323.797	4	*MB*	18778.362	$11387^{\circ}_{3\frac{1}{2}} - 30166_{3\frac{1}{2}}$	36
5259.353	1	*MB*	19008.455	$10798^{\circ}_{2\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−67	5324.199	3	*MB*	18776.944	$14049_{1\frac{1}{2}} - 32826^{\circ}_{1\frac{1}{2}}$	38
5259.702	20	*MB*	19007.194	$8927^{\circ}_{5\frac{1}{2}} - 27934_{4\frac{1}{2}}$	70	5324.985	2	*MB*	18774.173	$15134_{4\frac{1}{2}} - 33908^{\circ}_{4\frac{1}{2}}$	30
5261.197	4	*MB*	19001.793	$9723^{\circ}_{4\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−19	5325.741	6	*MB*	18771.508	$4737^{\circ}_{2\frac{1}{2}} - 23508_{1\frac{1}{2}}$	1
5261.620	15	*MB*	19000.265	$5819^{\circ}_{4\frac{1}{2}} - 24819_{3\frac{1}{2}}$	44	5326.607	6	*MB*	18768.456	$12466^{\circ}_{1\frac{1}{2}} - 31234_{2\frac{1}{2}}$	7
5265.676	250	*WA*	18985.630	$10058_{6\frac{1}{2}} - 29043^{\circ}_{6\frac{1}{2}}$	2	5327.490	8	*MB*	18765.345	$10684^{\circ}_{0\frac{1}{2}} - 29449_{1\frac{1}{2}}$	8
5267.902	10	*MB*	18977.607	$8927^{\circ}_{5\frac{1}{2}} - 27905_{4\frac{1}{2}}$	−35	5327.858	10	*MB*	18764.049	$14276_{5\frac{1}{2}} - 33040^{\circ}_{4\frac{1}{2}}$	−5
5268.390	12	*MB*	18975.849	$12762^{\circ}_{4\frac{1}{2}} - 31738_{5\frac{1}{2}}$	7	5328.430	2	*MB*			
5270.869	10	*MB*	18966.925	$13268_{2\frac{1}{2}} - 32235^{\circ}_{3\frac{1}{2}}$	−95	5328.645	6	*MB*	18761.278	$16159^{\circ}_{3\frac{1}{2}} - 34920_{3\frac{1}{2}}$	26
5273.345	15	*MB*	18958.020	$13758^{\circ}_{1\frac{1}{2}} - 32716_{2\frac{1}{2}}$	43	5330.544	400	*MB*	18754.594	$7011_{4\frac{1}{2}} - 25766^{\circ}_{4\frac{1}{2}}$	43
5273.914	20	*MB*	18955.974			5330.876	8	*MB*	18753.426	$11949^{\circ}_{3\frac{1}{2}} - 30702_{4\frac{1}{2}}$	6
5274.230	700	*MB*	18954.838	$8423_{6\frac{1}{2}} - 27378^{\circ}_{5\frac{1}{2}}$	−4	5332.208	10	*MB*	18748.742	$13217_{3\frac{1}{2}} - 31966^{\circ}_{2\frac{1}{2}}$	−29
5275.115	4	*MB*	18951.658	$9778^{\circ}_{2\frac{1}{2}} - 28730_{3\frac{1}{2}}$	−67					$13758^{\circ}_{1\frac{1}{2}} - 32507_{1\frac{1}{2}}$	−29
5275.814	70	*MB*	18949.147	$10314_{4\frac{1}{2}} - 29263^{\circ}_{5\frac{1}{2}}$	−28	5332.754	6	*MB*	18746.822	$18147^{\circ}_{2\frac{1}{2}} - 36893_{3\frac{1}{2}}$	57
5276.718	20	*MB*	18945.901	$19946^{\circ}_{1\frac{1}{2}} - 38892_{0\frac{1}{2}}$	−31	5333.882	10	*MB*	18742.857	$7202^{\circ}_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−9
5278.164	8	*MB*	18940.711	$10088^{\circ}_{1\frac{1}{2}} - 29029_{1\frac{1}{2}}$	−1	5335.554	3	*MB*	18736.984	$14252_{3\frac{1}{2}} - 32989^{\circ}_{3\frac{1}{2}}$	−55
5278.824	25	*MB*	18938.343	$4844^{\circ}_{1\frac{1}{2}} - 23782_{2\frac{1}{2}}$	−3	5336.473	3	*MB*	18733.757	$7746^{\circ}_{2\frac{1}{2}} - 26479_{1\frac{1}{2}}$	17
5281.711	15	*MB*	18927.991	$14481^{\circ}_{2\frac{1}{2}} - 33409_{3\frac{1}{2}}$	24	5337.668	4	*MB*	18729.563	$4910^{\circ}_{5\frac{1}{2}} - 23640_{4\frac{1}{2}}$	−36
5283.386	20	*MB*	18921.990	$9053_{3\frac{1}{2}} - 27975^{\circ}_{4\frac{1}{2}}$	1	5339.238	7	*MB*	18724.056	$14387_{4\frac{1}{2}} - 33111^{\circ}_{3\frac{1}{2}}$	5
5284.707	3	*MB*	18917.261			5339.423	10	*MB*	18723.407	$6638^{\circ}_{4\frac{1}{2}} - 25361_{4\frac{1}{2}}$	−8
5286.202	1	*MB*	18911.911	$19920^{\circ}_{3\frac{1}{2}} - 38832_{2\frac{1}{2}}$	15	5342.921	4	*MB*	18711.149	$9634^{\circ}_{1\frac{1}{2}} - 28345_{0\frac{1}{2}}$	19
5286.392	10	*MB*	18911.231	$9723^{\circ}_{4\frac{1}{2}} - 28634_{5\frac{1}{2}}$	50	5343.238	20	*MB*	18710.039	$13256_{1\frac{1}{2}} - 31966^{\circ}_{2\frac{1}{2}}$	−7
5286.681	12	*MB*	18910.197	$11759_{5\frac{1}{2}} - 30669^{\circ}_{4\frac{1}{2}}$	−37					$19138^{\circ}_{1\frac{1}{2}} - 37848_{2\frac{1}{2}}$	24
5286.955	3	*MB*	18909.217	$12704_{1\frac{1}{2}} - 31613^{\circ}_{0\frac{1}{2}}$	18	5343.816	25	*MB*	18708.016	$14827_{3\frac{1}{2}} - 33535^{\circ}_{3\frac{1}{2}}$	3
5287.658	8	*MB*	18906.703	$9778^{\circ}_{2\frac{1}{2}} - 28685_{2\frac{1}{2}}$	−68					$13527_{4\frac{1}{2}} - 32235^{\circ}_{3\frac{1}{2}}$	16
5293.404	8	*MB*	18886.180	$19946^{\circ}_{1\frac{1}{2}} - 38832_{2\frac{1}{2}}$	39	5344.142	4	*MB*	18706.874	$9198^{\circ}_{3\frac{1}{2}} - 27905_{4\frac{1}{2}}$	43
5294.855	7	*MB*	18881.005	$10869_{4\frac{1}{2}} - 29750^{\circ}_{5\frac{1}{2}}$	0	5345.065	10	*MB*	18703.644	$9634^{\circ}_{1\frac{1}{2}} - 28337_{2\frac{1}{2}}$	16
5295.139	6	*MB*	18879.992	$11949^{\circ}_{3\frac{1}{2}} - 30829_{3\frac{1}{2}}$	57	5347.835	50	*MB*	18693.956	$5969^{\circ}_{5\frac{1}{2}} - 24663_{4\frac{1}{2}}$	−89
5298.045	10	*MB*	18869.636	$10924^{\circ}_{4\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−4	5350.025	4	*MB*	18686.304	$7259^{\circ}_{3\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−16
5301.257	10	*MB*	18858.203	$11387^{\circ}_{3\frac{1}{2}} - 30245_{4\frac{1}{2}}$	57	5352.554	7	*MB*	18677.475	$11387^{\circ}_{3\frac{1}{2}} - 30065_{3\frac{1}{2}}$	42
5303.986	20	*MB*	18848.501	$14963^{\circ}_{5\frac{1}{2}} - 33811_{4\frac{1}{2}}$	34	5353.529	1000	*MB*	18674.074	$7092_{5\frac{1}{2}} - 25766^{\circ}_{4\frac{1}{2}}$	−16
5304.384	12	*MB*	18847.087	$8402^{\circ}_{3\frac{1}{2}} - 27249_{2\frac{1}{2}}$	86	5354.566	15	*MB*	18670.457	$9725_{3\frac{1}{2}} - 28396^{\circ}_{2\frac{1}{2}}$	40
5305.331	12	*MB*	18843.722	$16454_{2\frac{1}{2}} - 35298^{\circ}_{2\frac{1}{2}}$	88	5355.864	4	*MB*	18665.932	$19138^{\circ}_{1\frac{1}{2}} - 37804_{1\frac{1}{2}}$	33
										$11007^{\circ}_{1\frac{1}{2}} - 29673_{2\frac{1}{2}}$	−38
5305.758	7	*MB*	18842.206	$12365^{\circ}_{4\frac{1}{2}} - 31207_{3\frac{1}{2}}$	85						
5306.996	6	*MB*	18837.811	$19136^{\circ}_{2\frac{1}{2}} - 37973_{3\frac{1}{2}}$	59	5356.108	3	*MB*	18665.082	$17851^{\circ}_{0\frac{1}{2}} - 36516_{1\frac{1}{2}}$	84
5313.010	8	*MB*	18816.487			5356.362	10	*MB*	18664.197	$5118^{\circ}_{2\frac{1}{2}} - 23782_{2\frac{1}{2}}$	12
5313.080	6	*MB*	18816.239	$12751^{\circ}_{5\frac{1}{2}} - 31568_{4\frac{1}{2}}$	3					$4844^{\circ}_{1\frac{1}{2}} - 23508_{1\frac{1}{2}}$	−38
5313.282	9	*MB*	18815.524	$12260^{\circ}_{3\frac{1}{2}} - 31075_{4\frac{1}{2}}$	9	5357.937	15	*MB*	18658.710	$9316_{3\frac{1}{2}} - 27975^{\circ}_{4\frac{1}{2}}$	4
										$8774_{4\frac{1}{2}} - 27432^{\circ}_{4\frac{1}{2}}$	−7
5313.691	10	*MB*	18814.076								
5315.555	4	*MB*	18807.479	$4459^{\circ}_{3\frac{1}{2}} - 23267_{3\frac{1}{2}}$	0	5359.503	50	*MB*	18653.259	$14387_{4\frac{1}{2}} - 33040^{\circ}_{4\frac{1}{2}}$	18
5317.036	2	*MB*	18802.240	$13515^{\circ}_{3\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−81	5360.071	6	*MB*	18651.282	$10798^{\circ}_{2\frac{1}{2}} - 29449_{1\frac{1}{2}}$	59
5318.121	15	*MB*	18798.404	$13436_{2\frac{1}{2}} - 32235^{\circ}_{3\frac{1}{2}}$	23	5367.438	7	*MB*	18625.683	$17000_{3\frac{1}{2}} - 35625^{\circ}_{3\frac{1}{2}}$	−9
5318.830	5	*MB*	18795.898	$14739_{2\frac{1}{2}} - 33535^{\circ}_{3\frac{1}{2}}$	23	5367.970	15	*MB*	18623.837	$9725_{3\frac{1}{2}} - 28349^{\circ}_{3\frac{1}{2}}$	−11

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
5368.776	8	*MB*	18621.041	$19920°_{3\frac{1}{2}} - 38541_{4\frac{1}{2}}$	−18	5438.940	15	*MB*	18380.826	$14481°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−10
5369.156	15	*MB*	18619.723	$7061°_{0\frac{1}{2}} - 25681_{1\frac{1}{2}}$	73	5439.427	4	*MB*	18379.181	$9053_{3\frac{1}{2}} - 27432°_{4\frac{1}{2}}$	28
5369.866	8	*MB*	18617.261	$10646_{5\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	−6	5439.939	4	*MB*	18377.451		
5370.274	10	*MB*	18615.847	$10114°_{2\frac{1}{2}} - 28730_{3\frac{1}{2}}$	18	5441.731	40	*MB*	18371.399	$14739_{2\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	−2
5370.780	6	*MB*	18614.093	$9198°_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	21	5442.203	3	*MB*	18369.806	$18147°_{2\frac{1}{2}} - 36516_{1\frac{1}{2}}$	13
5374.237	15	*MB*	18602.119	$14387_{4\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	14	5442.658	4	*MB*	18368.270	$12057°_{2\frac{1}{2}} - 30425_{2\frac{1}{2}}$	28
5375.674	4	*MB*	18597.147	$10088°_{1\frac{1}{2}} - 28685_{2\frac{1}{2}}$	29	5445.999	12	*MB*	18357.002	$13012°_{2\frac{1}{2}} - 31369_{2\frac{1}{2}}$	4
5378.322	50	*MB*	18587.991	$14276_{5\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	11	5446.925	4	*MB*	18353.881	$13784°_{1\frac{1}{2}} - 32138_{2\frac{1}{2}}$	17
5380.267	5	*MB*	18581.271	$4322°_{2\frac{1}{2}} - 22903_{1\frac{1}{2}}$	6	5447.157	2	*MB*	18353.099		
5381.585	3	*MB*	18576.720	$12466°_{1\frac{1}{2}} - 31043_{2\frac{1}{2}}$	41	5449.403	7	*MB*	18345.535	$5437°_{3\frac{1}{2}} - 23782_{2\frac{1}{2}}$	−30
5382.340	4	*MB*	18574.115	$9723°_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−22	5449.581	10	*MB*	18344.936	$10684°_{0\frac{1}{2}} - 29029_{1\frac{1}{2}}$	24
5382.828	12	*MB*	18572.431	$12097_{3\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	5	5451.132	25	*MB*	18339.716	$14276_{5\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	−4
5382.992	5	*MB*	18571.865	$1410°_{4\frac{1}{2}} - 19982_{4\frac{1}{2}}$	−17	5453.029	4	*MB*	18333.336		
5383.287	2	*MB*	18570.847	$10114°_{2\frac{1}{2}} - 28685_{2\frac{1}{2}}$	−27	5453.259	3	*MB*	18332.563	$17475°_{4\frac{1}{2}} - 35807_{4\frac{1}{2}}$	18
5383.446	5	*MB*	18570.299			5454.887	3	*MB*	18327.092	$12762°_{4\frac{1}{2}} - 31089_{5\frac{1}{2}}$	2
5383.812	7	*MB*	18569.036	$12260°_{3\frac{1}{2}} - 30829_{3\frac{1}{2}}$	1	5458.104	50	*MB*	18316.290	$16545_{5\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	33
5384.031	12b	*MB*	18568.281	$14963°_{5\frac{1}{2}} - 33531_{6\frac{1}{2}}$	−6					$9198°_{3\frac{1}{2}} - 27514_{3\frac{1}{2}}$	−43
				$11340°_{3\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−24	5459.200	100	*MB*	18312.613	$13027_{6\frac{1}{2}} - 31340°_{6\frac{1}{2}}$	−21
5384.869	10	*MB*	18565.391	$30702_{4\frac{1}{2}} - 49267°_{4\frac{1}{2}}$	20					$26817_{2\frac{1}{2}} - 45130°_{2\frac{1}{2}}$	20
				$9269°_{0\frac{1}{2}} - 27835_{1\frac{1}{2}}$	−15	5459.812	7	*MB*	18310.560		
5386.259	6	*MB*	18560.601			5459.901	7	*MB*	18310.262	$8169°_{1\frac{1}{2}} - 26479_{1\frac{1}{2}}$	34
5386.770	120b	*MB*	18558.840	$9778°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	12	5460.056	20	*MB*	18309.742	$4266°_{3\frac{1}{2}} - 22576_{2\frac{1}{2}}$	−30
5389.452	8	*MB*	18549.604	$6549°_{2\frac{1}{2}} - 25099_{1\frac{1}{2}}$	31	5461.791	2	*MB*	18303.926		
5390.524	10	*MB*	18545.915	$7722_{2\frac{1}{2}} - 26268°_{3\frac{1}{2}}$	−2	5462.188	7	*MB*	18302.595	$7059°_{4\frac{1}{2}} - 25361_{4\frac{1}{2}}$	−6
5393.393	600	*MB*	18536.050	$8896_{5\frac{1}{2}} - 27432°_{4\frac{1}{2}}$	−2	5463.238	8	*MB*	18299.078	$10035°_{5\frac{1}{2}} - 28334_{4\frac{1}{2}}$	33
5396.662	6	*MB*	18524.822	$22576_{2\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	60	5464.206	100	*MB*	18295.836	$11454_{6\frac{1}{2}} - 29750°_{5\frac{1}{2}}$	−9
5398.504	40	*MB*	18518.502	$9778°_{2\frac{1}{2}} - 28297_{3\frac{1}{2}}$	15	5465.636	4	*MB*	18291.049	$13675_{2\frac{1}{2}} - 31966°_{2\frac{1}{2}}$	24
5402.836	4	*MB*	18503.653	$11742°_{5\frac{1}{2}} - 30245_{4\frac{1}{2}}$	21	5468.371	200	*MB*	18281.901	$11309_{7\frac{1}{2}} - 29591°_{6\frac{1}{2}}$	0
5406.675	25	*MB*	18490.515	$13256_{1\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	−26	5469.443	4	*MB*	18278.318	$13659°_{4\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−5
5409.232	600	*MB*	18481.775	$8896_{5\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	−10	5470.465	15	*MB*	18274.903	$14097_{3\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	−23
5410.049	40	*MB*	18478.983	$13268_{2\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	−41	5471.009	5	*MB*	18273.086	$6389°_{4\frac{1}{2}} - 24663_{4\frac{1}{2}}$	−26
				$7202°_{2\frac{1}{2}} - 25681_{1\frac{1}{2}}$	25	5471.969	10	*MB*	18269.880		
5413.049	12	*MB*	18468.742	$11325°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	6	5472.101	4	*MB*	18269.440	$6549°_{2\frac{1}{2}} - 24819_{3\frac{1}{2}}$	14
5413.716	15	*MB*	18466.467	$11340°_{3\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−12	5472.290	300	*MB*	18268.809	$10058_{6\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	−35
5417.826	40	*MB*	18452.458	$19136°_{2\frac{1}{2}} - 37588_{3\frac{1}{2}}$	9	5475.931	2	*MB*	18256.662	$10088°_{1\frac{1}{2}} - 28345_{0\frac{1}{2}}$	−13
				$8927°_{5\frac{1}{2}} - 27379_{5\frac{1}{2}}$	23						
						5477.969	4	*MB*	18249.870	$9725_{3\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	−15
5421.876	4	*MB*	18438.675	$8402°_{3\frac{1}{2}} - 26841_{4\frac{1}{2}}$	−40	5479.806	7	*MB*	18243.752	$13503_{0\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	17
5422.150	7	*MB*	18437.743			5480.631	8	*MB*	18241.006	$17475°_{4\frac{1}{2}} - 35716_{5\frac{1}{2}}$	−53
5424.150	8	*MB*	18430.945			5481.302	40	*MB*	18238.773	$14625_{5\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	−1
5424.482	7	*MB*	18429.817	$22290_{1\frac{1}{2}} - 40720°_{1\frac{1}{2}}$	10	5483.672	8	*MB*	18230.890	$7522°_{5\frac{1}{2}} - 25753_{6\frac{1}{2}}$	19
5424.608	8	*MB*	18429.389	$6389°_{4\frac{1}{2}} - 24819_{3\frac{1}{2}}$	−2	5484.693	6	*MB*	18227.496	$9723°_{4\frac{1}{2}} - 27950_{5\frac{1}{2}}$	−59
5425.794	12	*MB*	18425.360	$7341_{5\frac{1}{2}} - 25766°_{4\frac{1}{2}}$	13	5484.874	20	*MB*	18226.895	$13117_{4\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	−10
5426.848	10	*MB*	18421.782	$13515°_{3\frac{1}{2}} - 31937_{3\frac{1}{2}}$	−17	5486.061	20	*MB*	18222.951	$10114°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	20
5427.564	30	*MB*	18419.352	$11387°_{3\frac{1}{2}} - 29807_{3\frac{1}{2}}$	5	5487.899	7	*MB*	18216.848	$11949°_{3\frac{1}{2}} - 30166_{3\frac{1}{2}}$	−19
5428.889	15	*MB*	18414.856	$14625_{5\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	6	5488.886	6	*MB*	18213.572	$19920°_{3\frac{1}{2}} - 38134_{4\frac{1}{2}}$	−14
5432.512	10	*MB*	18402.575	$7278°_{1\frac{1}{2}} - 25681_{1\frac{1}{2}}$	9	5489.767	5	*MB*	18210.650	$5942°_{3\frac{1}{2}} - 24153_{3\frac{1}{2}}$	−17
5433.924	20	*MB*	18397.793	$10646_{5\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	10	5493.486	3	*MB*	18198.321	$7293°_{6\frac{1}{2}} - 25492_{5\frac{1}{2}}$	8
5435.104	8	*MB*	18393.799	$10869_{4\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	2	5496.431	2	*MB*	18188.571	$5964°_{3\frac{1}{2}} - 24153_{3\frac{1}{2}}$	1
5435.244	7	*MB*	18393.325	$0°_{3\frac{1}{2}} - 18393_{3\frac{1}{2}}$	−1	5498.470	4	*MB*	18181.826	$9723°_{4\frac{1}{2}} - 27905_{4\frac{1}{2}}$	4
5435.423	1	*MB*	18392.720	$4511°_{2\frac{1}{2}} - 22903_{1\frac{1}{2}}$	3	5498.704	4	*MB*	18181.052	$6638°_{4\frac{1}{2}} - 24819_{3\frac{1}{2}}$	−23

501-968 O - 73 - 10

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
5501.810	5	*MB*	18170.788	$12466°_{1\frac{1}{2}} - 30637_{2\frac{1}{2}}$	62	5577.145	6	*MB*	17925.343	$17300°_{3\frac{1}{2}} - 35225_{2\frac{1}{2}}$	−2
5503.481	8	*MB*	18165.271	$12260°_{3\frac{1}{2}} - 30425_{2\frac{1}{2}}$	10	5577.512	6	*MB*	17924.164		
5504.592	20	*MB*	18161.605	$14827_{3\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	10	5580.661	30	*MB*	17914.050	$27950_{5\frac{1}{2}} - 45864°_{5\frac{1}{2}}$	−8
5505.606	10	*MB*	18158.260	$27706_{6\frac{1}{2}} - 45864°_{5\frac{1}{2}}$	−58	5582.548	60	*MB*	17907.995	$13436_{2\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	25
5505.764	4	*MB*	18157.739	$14727_{1\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	−87	5583.176	10	*MB*	17905.980	$12260°_{3\frac{1}{2}} - 30166_{3\frac{1}{2}}$	12
5505.942	15	*MB*	18157.152	$7202°_{2\frac{1}{2}} - 25359_{2\frac{1}{2}}$	−4	5587.192	2	*MB*	17893.110	$5010°_{2\frac{1}{2}} - 22903_{1\frac{1}{2}}$	6
5508.556	7	*MB*	18148.536	$5118°_{2\frac{1}{2}} - 23267_{3\frac{1}{2}}$	−8	5588.760	15	*MB*	17888.090		
5509.444	25	*MB*	18145.611	$14739_{2\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	5	5590.180	15	*MB*	17883.546	$10454°_{1\frac{1}{2}} - 28337_{2\frac{1}{2}}$	4
5512.049	500b	*MB*	18137.035	$8131_{4\frac{1}{2}} - 26268°_{3\frac{1}{2}}$	49	5594.464	12	*MB*	17869.852		
5512.384	25	*MB*	18135.933	$16159°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	19	5594.719	50	*MB*	17869.037	$14097_{3\frac{1}{2}} - 31966°_{2\frac{1}{2}}$	−16
5513.118	40	*MB*	18133.518	$11458_{5\frac{1}{2}} - 29591°_{6\frac{1}{2}}$	−1	5596.681	30	*MB*	17862.773	$13268_{2\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	8
5514.776	3	*MB*	18128.067	$7233°_{5\frac{1}{2}} - 25361_{4\frac{1}{2}}$	20	5599.061	50	*MB*	17855.180	$15134_{4\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	13
5516.085	60	*MB*	18123.765	$13027_{6\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	−10	5599.684	2	*MB*	17853.194	$13515°_{3\frac{1}{2}} - 31369_{2\frac{1}{2}}$	−45
5518.490	100	*MB*	18115.866	$9316_{3\frac{1}{2}} - 27432°_{4\frac{1}{2}}$	−3	5600.182	15	*MB*	17851.606	$12097_{3\frac{1}{2}} - 29948°_{2\frac{1}{2}}$	−31
5520.180	30	*MB*	18110.320	$13503_{0\frac{1}{2}} - 31613°_{0\frac{1}{2}}$	−4	5602.150	8	*MB*	17845.335	$11949°_{3\frac{1}{2}} - 29794_{3\frac{1}{2}}$	7
5521.842	40	*MB*	18104.870	$15803_{4\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	−12	5603.765	5	*MB*	17840.192	$5942°_{3\frac{1}{2}} - 23782_{2\frac{1}{2}}$	0
5523.591	15	*MB*	18099.137	$14727_{1\frac{1}{2}} - 32826°_{1\frac{1}{2}}$	9	5604.124	6	*MB*	17839.049	$14963°_{5\frac{1}{2}} - 32802_{5\frac{1}{2}}$	−15
5524.447	25	*MB*	18096.332	$14276_{5\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	10					$7522°_{5\frac{1}{2}} - 25361_{4\frac{1}{2}}$	−2
5526.355	3	*MB*				5604.204	6	*MB*	17838.795	$4737°_{2\frac{1}{2}} - 22576_{2\frac{1}{2}}$	−1
5526.862	20	*MB*	18088.425	$4201°_{1\frac{1}{2}} - 22290_{1\frac{1}{2}}$	−1	5605.843	2	*MB*	17833.579	$23267_{3\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	−1
5527.322	4	*MB*	18086.920	$14739_{2\frac{1}{2}} - 32826°_{1\frac{1}{2}}$	13	5606.218	2	*MB*	17832.386	$11759_{5\frac{1}{2}} - 29591°_{6\frac{1}{2}}$	−19
5532.042	20	*MB*	18071.488	$13675_{2\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	−32	5610.249	150	*MB*	17819.574	$8448_{2\frac{1}{2}} - 26268°_{3\frac{1}{2}}$	12
5532.267	2	*MB*	18070.753	$1410°_{4\frac{1}{2}} - 19481_{4\frac{1}{2}}$	17	5610.494	40	*MB*	17818.795	$13027_{6\frac{1}{2}} - 30846°_{7\frac{1}{2}}$	−28
5533.554	12	*MB*	18066.550	$13784°_{1\frac{1}{2}} - 31851_{2\frac{1}{2}}$	−12	5610.876	40	*MB*	17817.582	$13527_{4\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	−6
5535.758	2	*MB*	18059.357	$4844°_{1\frac{1}{2}} - 22903_{1\frac{1}{2}}$	27					$16159°_{3\frac{1}{2}} - 33977_{3\frac{1}{2}}$	−21
5536.694	1	*MB*	18056.304	$9778°_{2\frac{1}{2}} - 27835_{1\frac{1}{2}}$	58	5613.691	70	*MB*	17808.648	$11454_{6\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	11
5537.293	30	*MB*	18054.351	$17571_{4\frac{1}{2}} - 35625°_{3\frac{1}{2}}$	52	5616.338	10	*MB*	17800.255	$12365°_{4\frac{1}{2}} - 30166_{3\frac{1}{2}}$	4
5538.990	5	*MB*	18048.820	$15859_{4\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	−9					$10924°_{4\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−16
5540.212	1	*MB*	18044.839	$11949°_{3\frac{1}{2}} - 29994_{2\frac{1}{2}}$	−12	5620.086	7	*MB*	17788.384	$14827_{3\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	−11
5542.014	10	*MB*	18038.972	$11325°_{2\frac{1}{2}} - 29364_{3\frac{1}{2}}$	13	5622.083	7	*MB*	17782.065		
5543.107	5	*MB*	18035.415	$10314_{4\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	−4	5623.004	40	*MB*	17779.153	$7713°_{4\frac{1}{2}} - 25492_{5\frac{1}{2}}$	−8
5543.723	30	*MB*	18033.410	$9778°_{2\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−1	5625.221	15	*MB*	17772.146	$15822_{3\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	53
5544.465	7	*MB*	18030.997	$13012°_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−17	5626.048	6	*MB*	17769.534	$8175°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	1
5546.370	10	*MB*	18024.804	$6638°_{4\frac{1}{2}} - 24663_{4\frac{1}{2}}$	9	5626.728	25	*MB*	17767.386	$13256_{1\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	11
5547.074	8	*MB*	18022.517	$10274°_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	15	5628.981	12	*MB*	17760.275	$7059°_{4\frac{1}{2}} - 24819_{3\frac{1}{2}}$	13
5548.600	20	*MB*	18017.560	$15576_{1\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	−23	5630.380	30	*MB*	17755.862	$13268_{2\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	4
5550.037	70	*MB*	18012.895	$10314_{4\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	−13	5631.401	5	*MB*	17752.643		
5551.721	15	*MB*	18007.431	$13758°_{1\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−7	5633.306	6	*MB*	17746.639	$10088°_{1\frac{1}{2}} - 27835_{1\frac{1}{2}}$	47
5556.767	30	*MB*	17991.079	$11759_{5\frac{1}{2}} - 29750°_{5\frac{1}{2}}$	0	5636.239	2	*MB*	17737.404	$12057°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	−5
5556.946	120	*MB*	17990.500	$14625_{5\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	−15	5637.353	100	*MB*	17733.899	$11309_{7\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	18
5558.483	5	*MB*	17985.525	$14387_{4\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	16	5637.473	4	*MB*	17733.522		
5559.804	8	*MB*	17981.252	$13784°_{1\frac{1}{2}} - 31766_{1\frac{1}{2}}$	−22	5637.872	10	*MB*	17732.267	$15803_{4\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	−58
5561.086	20	*MB*	17977.107	$15134_{4\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	−5	5638.098	5	*MB*	17731.556	$4844°_{1\frac{1}{2}} - 22576_{2\frac{1}{2}}$	30
5561.448	40	*MB*	17975.936	$11759_{5\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	−9	5638.305	3	*MB*			
5565.506	3	*MB*	17962.830	$16192°_{4\frac{1}{2}} - 34155_{3\frac{1}{2}}$	−14	5640.583	5	*MB*	17723.744	$10088°_{1\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−13
5566.710	4	*MB*	17958.945	$12466°_{1\frac{1}{2}} - 30425_{2\frac{1}{2}}$	26	5645.954	10	*MB*	17706.884	$27187_{3\frac{1}{2}} - 44893°_{3\frac{1}{2}}$	−7
5571.055	3	*MB*	17944.938			5648.947	10	*MB*	17697.502	$14049_{1\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	20
5571.439	3	*MB*	17943.702	$26479_{1\frac{1}{2}} - 44423°_{1\frac{1}{2}}$	53					$10114°_{2\frac{1}{2}} - 27812_{2\frac{1}{2}}$	−12
5575.261	2	*MB*	17931.401	$14481°_{2\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−14	5650.025	5	*MB*	17694.126	$13436_{2\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	−2
5575.267	2	*MB*	17931.381	$14481°_{2\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−34	5654.225	10	*MB*	17680.983	$10646_{5\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	−17

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
5655.637	3	*MB*	17676.568			5733.696	15	*MB*	17435.920	$12456_{3\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	−10
5655.693	8	*MB*	17676.393	$15434_{2\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	−70	5740.169	25	*MB*	17416.259	$13659°_{4\frac{1}{2}} - 31075_{4\frac{1}{2}}$	−14
5659.519	10	*MB*	17664.444	$8280°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−5	5740.330	20	*MB*	17415.770	$12704_{1\frac{1}{2}} - 30120°_{1\frac{1}{2}}$	−1
5660.479	20	*MB*	17661.448	$10314_{4\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	−8	5741.575	8	*MB*	17411.994	$13758°_{1\frac{1}{2}} - 31170_{1\frac{1}{2}}$	19
5662.230	4	*MB*	17655.986	$10641°_{2\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−44	5743.652	5	*MB*	17405.697	$987°_{4\frac{1}{2}} - 18393_{3\frac{1}{2}}$	−18
5665.339	20	*MB*	17646.297	$10703_{4\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	20	5744.221	12	*MB*	17403.973	$7259°_{3\frac{1}{2}} - 24663_{4\frac{1}{2}}$	−6
5667.967	25	*MB*	17638.115	$12097_{3\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	−21	5744.401	20	*MB*	17403.428	$12762°_{4\frac{1}{2}} - 30166_{3\frac{1}{2}}$	12
5668.917	200	*MB*	17635.160	$8131_{4\frac{1}{2}} - 25766°_{4\frac{1}{2}}$	22	5747.830	4	*MB*	17393.046	$16159°_{3\frac{1}{2}} - 33552_{2\frac{1}{2}}$	0
5672.402	2	*MB*	17624.325	$13527_{4\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	30	5750.634	30	*MB*	17384.565	$11340°_{3\frac{1}{2}} - 28725_{4\frac{1}{2}}$	15
5672.583	5	*MB*	17623.763	$10703_{4\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	−2	5751.095	10	*MB*	17383.171	$12751°_{5\frac{1}{2}} - 30134_{5\frac{1}{2}}$	44
5673.492	2	*MB*	17620.939	$5283°_{0\frac{1}{2}} - 22903_{1\frac{1}{2}}$	−5	5751.821	5	*MB*	17380.977	$10454°_{1\frac{1}{2}} - 27835_{1\frac{1}{2}}$	17
5678.438	10	*MB*	17605.591	$26817_{2\frac{1}{2}} - 44423°_{1\frac{1}{2}}$	−47	5754.676	20	*MB*	17372.354	$12762°_{4\frac{1}{2}} - 30134_{5\frac{1}{2}}$	86
5679.030	40	*MB*	17603.756	$13527_{4\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	12	5755.622	4	*MB*	17369.499	$14481°_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	32
5680.260	40	*MB*	17599.944	$2382°_{4\frac{1}{2}} - 19982_{4\frac{1}{2}}$	3	5757.799	25	*MB*	17362.932	$16545_{5\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	8
5682.956	10	*MB*	17591.595	$5675°_{4\frac{1}{2}} - 23267_{3\frac{1}{2}}$	7	5760.165	30	*MB*	17355.800	$15529_{2\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	9
5683.109	40	*MB*	17591.121	$15235_{1\frac{1}{2}} - 32826°_{1\frac{1}{2}}$	32	5762.627	20	*MB*	17348.385	$13675_{2\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	31
5683.747	70	*MB*	17589.146	$11454_{6\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	−6	5762.997	60	*MB*	17347.271	$28096_{8\frac{1}{2}} - 45443°_{7\frac{1}{2}}$	−8
5684.366	20	*MB*	17587.231	$13436_{2\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	9	5764.673	20	*MB*	17342.228	$31747°_{1\frac{1}{2}} - 49089_{2\frac{1}{2}}$	−14
5684.928	30	*MB*	17585.493	$11458_{5\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	−7					$17171°_{5\frac{1}{2}} - 34513_{6\frac{1}{2}}$	5
5685.836	100	*MB*	17582.684	$15281_{6\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	8	5766.273	8	*MB*	17337.416	$11387°_{3\frac{1}{2}} - 28725_{4\frac{1}{2}}$	0
5687.544	6	*MB*	17577.404	$3363°_{2\frac{1}{2}} - 20940_{3\frac{1}{2}}$	−7	5768.887	160	*MB*	17329.560	$10646_{5\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	11
5687.669	3	*MB*	17577.018	$7522°_{0\frac{1}{2}} - 25099_{1\frac{1}{2}}$	−5	5769.005	50	*MB*	17329.205		
5688.113	20	*MB*	17575.646	$10820_{2\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	−17	5770.555	15	*MB*	17324.551	$5942°_{3\frac{1}{2}} - 23267_{3\frac{1}{2}}$	−1
5691.475	20	*MB*	17565.264	$5010°_{2\frac{1}{2}} - 22576_{2\frac{1}{2}}$	−35	5771.485	8	*MB*	17321.759	$17976_{2\frac{1}{2}} - 35298°_{2\frac{1}{2}}$	−17
5693.088	5	*MB*	17560.287	$7259°_{3\frac{1}{2}} - 24819_{3\frac{1}{2}}$	28	5771.976	60	*MB*	17320.286	$10058_{6\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	−2
5694.960	15	*MB*	17554.515	$15434_{2\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	−3	5773.442	20	*MB*	17315.888	$15510_{0\frac{1}{2}} - 32826°_{1\frac{1}{2}}$	6
5695.842	80	*MB*	17551.797	$13117_{4\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	17	5775.802	50	*MB*	17308.813	$15576_{1\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	14
5696.084	2	*MB*	17551.051	$5716°_{3\frac{1}{2}} - 23267_{3\frac{1}{2}}$	−83	5777.938	3	*MB*	17302.414	$5964°_{3\frac{1}{2}} - 23267_{3\frac{1}{2}}$	−40
5697.402	20	*MB*	17546.991	$12260°_{3\frac{1}{2}} - 29807_{3\frac{1}{2}}$	1	5779.710	8	*MB*	17297.109	$15529_{2\frac{1}{2}} - 32826°_{1\frac{1}{2}}$	17
5698.624	6	*MB*	17543.228			5782.047	15	*MB*	17290.118	$17571_{4\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	−6
5698.786	8	*MB*	17542.729	$8402°_{3\frac{1}{2}} - 25945_{3\frac{1}{2}}$	2	5783.953	60	*MB*	17284.420	$11759_{5\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	34
5699.912	10	*MB*	17539.264	$10798°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	5	5784.149	30	*MB*	17283.835	$27353_{7\frac{1}{2}} - 44637°_{6\frac{1}{2}}$	−42
5700.504	4	*MB*	17537.443	$10274°_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	16	5787.544	8	*MB*	17273.696		
5702.626	7	*MB*	17530.917			5788.025	30	*MB*	17272.261	$10703_{4\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	−52
5703.217	80	*MB*	17529.100	$10820_{2\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	4	5788.572	20	*MB*	17270.628	$15593_{6\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	11
5706.248	10	*MB*	17519.789	$23200_{2\frac{1}{2}} - 40720°_{1\frac{1}{2}}$	−1	5790.345	10	*MB*	17265.340	$6517°_{2\frac{1}{2}} - 23782_{2\frac{1}{2}}$	−31
5707.733	3	*MB*	17515.231	$6638°_{4\frac{1}{2}} - 24153_{3\frac{1}{2}}$	23	5795.361	6	*MB*	17250.397	$16159°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	36
5708.486	12	*MB*	17512.921	$17300°_{3\frac{1}{2}} - 34813_{2\frac{1}{2}}$	29	5796.453	25	*MB*	17247.147	$14097_{3\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	13
5711.433	100	*MB*	17503.884	$11759_{5\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	14	5797.420	30	*MB*	17244.270	$12704_{1\frac{1}{2}} - 29948°_{2\frac{1}{2}}$	−9
5715.260	80	*MB*	17492.164	$12456_{3\frac{1}{2}} - 29948°_{2\frac{1}{2}}$	−3	5798.297	15	*MB*	17241.662	$7259°_{3\frac{1}{2}} - 24500_{2\frac{1}{2}}$	−18
5717.641	3	*MB*	17484.880	$15565°_{2\frac{1}{2}} - 33050_{1\frac{1}{2}}$	9	5798.963	12	*MB*	17239.682	$10274°_{3\frac{1}{2}} - 27514_{3\frac{1}{2}}$	−6
5717.893	2	*MB*	17484.109	$5716°_{3\frac{1}{2}} - 23200_{2\frac{1}{2}}$	−5	5799.340	6	*MB*	17238.561	$15134_{4\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	−9
5718.591	50	*MB*	17481.975	$15134_{4\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	6	5799.791	30	*MB*	17237.221	$25492_{5\frac{1}{2}} - 42729°_{5\frac{1}{2}}$	25
5726.648	3	*MB*	17457.379	$5118°_{2\frac{1}{2}} - 22576_{2\frac{1}{2}}$	15					$3703°_{3\frac{1}{2}} - 20940_{3\frac{1}{2}}$	−23
5727.249	50	*MB*	17455.547	$17571_{4\frac{1}{2}} - 35026°_{4\frac{1}{2}}$	4	5800.401	6	*MB*	17235.408	$5964°_{3\frac{1}{2}} - 23200_{2\frac{1}{2}}$	−26
5728.528	8	*MB*	17451.650	$13217_{3\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	−75	5801.183	10	*MB*	17233.085	$6549°_{2\frac{1}{2}} - 23782_{2\frac{1}{2}}$	2
5729.002	10	*MB*	17450.206	$14315°_{0\frac{1}{2}} - 31766_{1\frac{1}{2}}$	29	5803.240	15	*MB*	17226.976	$14739_{2\frac{1}{2}} - 31966°_{2\frac{1}{2}}$	−10
5729.647	8	*MB*	17448.242	$5819°_{4\frac{1}{2}} - 23267_{3\frac{1}{2}}$	4	5804.160	10	*MB*	17224.246	$12057°_{2\frac{1}{2}} - 29281_{2\frac{1}{2}}$	−20
5731.763	8	*MB*	17441.800	$16152_{3\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	26	5805.402	7	*MB*	17220.561	$25492_{5\frac{1}{2}} - 42712°_{6\frac{1}{2}}$	2
5731.938	15	*MB*	17441.268	$12365°_{4\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−3	5806.161	25	*MB*	17218.310	$15822_{3\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	16

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
5807.443	5	*MB*	17214.509	$9053_{3\frac{1}{2}} - 26268^{\circ}_{3\frac{1}{2}}$	−64	5898.085	30	*MB*	16949.958	$7713^{\circ}_{4\frac{1}{2}} - 24663_{4\frac{1}{2}}$	−7
5808.546	6	*MB*	17211.240	$23508_{1\frac{1}{2}} - 40720^{\circ}_{1\frac{1}{2}}$	−1	5898.947	15	*MB*	16947.481	$24153_{3\frac{1}{2}} - 41100^{\circ}_{2\frac{1}{2}}$	15
5814.422	1	*MB*	17193.847	$10641^{\circ}_{2\frac{1}{2}} - 27835_{1\frac{1}{2}}$	56	5899.096	2	*MB*	16947.053	$11387^{\circ}_{3\frac{1}{2}} - 28334_{4\frac{1}{2}}$	28
5815.759	5	*MB*	17189.894	$3593^{\circ}_{4\frac{1}{2}} - 20783_{5\frac{1}{2}}$	−15	5899.990	2	*MB*	16944.485		
5817.104	15	*MB*	17185.919	$15803_{4\frac{1}{2}} - 32989^{\circ}_{3\frac{1}{2}}$	12	5902.541	10	*MB*	16937.162	$23782_{2\frac{1}{2}} - 40720^{\circ}_{1\frac{1}{2}}$	31
5817.812	60	*MB*	17183.828	$8175^{\circ}_{2\frac{1}{2}} - 25359_{2\frac{1}{2}}$	5	5904.727	10	*MB*	16930.892	$27706_{6\frac{1}{2}} - 44637^{\circ}_{6\frac{1}{2}}$	−24
5818.769	15	*MB*	17181.002	$15859_{4\frac{1}{2}} - 33040^{\circ}_{4\frac{1}{2}}$	12	5906.296	10	*MB*	16926.394	$14097_{3\frac{1}{2}} - 31024^{\circ}_{2\frac{1}{2}}$	13
5820.145	5	*MB*	17176.940	$9723^{\circ}_{4\frac{1}{2}} - 26900_{3\frac{1}{2}}$	−78	5908.540	2	*MB*	16919.966	$16159^{\circ}_{3\frac{1}{2}} - 33079_{3\frac{1}{2}}$	−9
5822.487	10	*MB*	17170.031	$10641^{\circ}_{2\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−22	5912.653	25	*MB*	16908.196	$17000_{3\frac{1}{2}} - 33908^{\circ}_{4\frac{1}{2}}$	10
5823.455	40	*MB*	17167.177	$15827_{3\frac{1}{2}} - 32989^{\circ}_{3\frac{1}{2}}$	18	5913.247	2	*MB*	16906.498	$12260^{\circ}_{3\frac{1}{2}} - 29166_{4\frac{1}{2}}$	−10
5826.865	20	*MB*	17157.130	$12751^{\circ}_{5\frac{1}{2}} - 29908_{4\frac{1}{2}}$	9	5915.461	2	*MB*	16900.170		
5828.864	8	*MB*	17151.246	$15565^{\circ}_{2\frac{1}{2}} - 32716_{2\frac{1}{2}}$	20	5915.604	5	*MB*	16899.761	$2581^{\circ}_{4\frac{1}{2}} - 19481_{4\frac{1}{2}}$	−21
5830.556	8	*MB*	17146.269	$12762^{\circ}_{4\frac{1}{2}} - 29908_{4\frac{1}{2}}$	6	5916.305	6	*MB*	16897.759	$19946^{\circ}_{1\frac{1}{2}} - 36844_{2\frac{1}{2}}$	22
5832.293	30	*MB*	17141.163	$8804^{\circ}_{4\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−8	5917.192	1	*MB*	16895.226		
5832.802	12	*MB*	17139.667	$16454_{2\frac{1}{2}} - 33594^{\circ}_{2\frac{1}{2}}$	70	5918.237	2	*MB*	16892.243	$11742^{\circ}_{5\frac{1}{2}} - 28634_{5\frac{1}{2}}$	−27
5832.979	20	*MB*	17139.147	$14827_{3\frac{1}{2}} - 31966^{\circ}_{2\frac{1}{2}}$	22	5919.726	2	*MB*	16887.994	$16152_{3\frac{1}{2}} - 33040^{\circ}_{4\frac{1}{2}}$	18
5833.636	1	*MB*	17137.217	$16159^{\circ}_{3\frac{1}{2}} - 33296_{4\frac{1}{2}}$	−51	5919.872	10	*MB*	16887.577	$2595^{\circ}_{1\frac{1}{2}} - 19483_{2\frac{1}{2}}$	−3
5838.069	15	*MB*	17124.204	$17171^{\circ}_{5\frac{1}{2}} - 34295_{4\frac{1}{2}}$	0	5920.334	10	*MB*	16886.260	$14727_{1\frac{1}{2}} - 31613^{\circ}_{0\frac{1}{2}}$	−32
5839.040	20	*MB*	17121.356	$9778^{\circ}_{2\frac{1}{2}} - 26900_{3\frac{1}{2}}$	−11	5920.571	8	*MB*	16885.584	$16159^{\circ}_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	25
5839.987	10	*MB*	17118.580	$10314_{4\frac{1}{2}} - 27432^{\circ}_{4\frac{1}{2}}$	−39	5921.150	8	*MB*	16883.933		
5840.151	3	*MB*	17118.099	$9723^{\circ}_{4\frac{1}{2}} - 26841_{4\frac{1}{2}}$	51	5922.949	50	*MB*	16878.804	$14252_{3\frac{1}{2}} - 31130^{\circ}_{3\frac{1}{2}}$	0
5842.093	20	*MB*	17112.409	$12326^{\circ}_{6\frac{1}{2}} - 29438_{5\frac{1}{2}}$	9	5924.195	7	*MB*	16875.254	$14276_{5\frac{1}{2}} - 31151^{\circ}_{5\frac{1}{2}}$	19
5845.925	20	*MB*	17101.192	$15134_{4\frac{1}{2}} - 32235^{\circ}_{3\frac{1}{2}}$	3	5924.905	25	*MB*	16873.232	$10641^{\circ}_{2\frac{1}{2}} - 27514_{3\frac{1}{2}}$	15
5846.750	7	*MB*	17098.779	$2382^{\circ}_{4\frac{1}{2}} - 19481_{4\frac{1}{2}}$	−14	5925.210	12	*MB*	16872.364	$11454_{6\frac{1}{2}} - 28327^{\circ}_{5\frac{1}{2}}$	−5
5848.839	40	*MB*	17092.672	$14252_{3\frac{1}{2}} - 31344^{\circ}_{3\frac{1}{2}}$	22	5926.183	12	*MB*	16869.594	$8896_{5\frac{1}{2}} - 25766^{\circ}_{4\frac{1}{2}}$	−31
5852.802	5	*MB*	17081.098	$16454_{2\frac{1}{2}} - 33535^{\circ}_{3\frac{1}{2}}$	18	5926.951	8	*MB*	16867.408		
5858.544	40	*MB*	17064.357	$10314_{4\frac{1}{2}} - 27378^{\circ}_{5\frac{1}{2}}$	4	5928.257	25	*MB*	16863.692	$13256_{1\frac{1}{2}} - 30120^{\circ}_{1\frac{1}{2}}$	−12
5860.365	7	*MB*	17059.055			5929.406	15	*MB*	16860.424	$9491^{\circ}_{0\frac{1}{2}} - 26351_{0\frac{1}{2}}$	6
5873.359	1	*MB*	17021.314	$12260^{\circ}_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	29	5930.555	1	*MB*	16857.157		
5876.550	8	*MB*	17012.072	$11325^{\circ}_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	39	5930.928	2	*MB*	16856.097	$16133_{2\frac{1}{2}} - 32989^{\circ}_{3\frac{1}{2}}$	74
5878.144	20	*MB*	17007.459	$14739_{2\frac{1}{2}} - 31747^{\circ}_{1\frac{1}{2}}$	−22	5932.300	15	*MB*	16852.199	$13268_{2\frac{1}{2}} - 30120^{\circ}_{1\frac{1}{2}}$	11
5879.030	20	*MB*	17004.896	$15859_{4\frac{1}{2}} - 32864^{\circ}_{5\frac{1}{2}}$	−18	5933.593	20	*MB*	16848.527	$2634^{\circ}_{2\frac{1}{2}} - 19483_{2\frac{1}{2}}$	−31
5879.677	6	*MB*	17003.024	$19920^{\circ}_{3\frac{1}{2}} - 36923_{4\frac{1}{2}}$	49	5934.571	20	*MB*	16845.750	$9634^{\circ}_{1\frac{1}{2}} - 26479_{1\frac{1}{2}}$	10
5881.689	30	*MB*	16997.208	$11340^{\circ}_{3\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−7	5936.019	3	*MB*	16841.641	$2641^{\circ}_{3\frac{1}{2}} - 19483_{2\frac{1}{2}}$	−24
5883.746	6	*MB*	16991.266	$6517^{\circ}_{2\frac{1}{2}} - 23508_{1\frac{1}{2}}$	5	5938.262	15	*MB*	16835.279	$23640_{4\frac{1}{2}} - 40475^{\circ}_{3\frac{1}{2}}$	−82
5884.736	15	*MB*	16988.407	$9491^{\circ}_{0\frac{1}{2}} - 26479_{1\frac{1}{2}}$	−25	5941.539	50	*MB*	16825.994	$8927^{\circ}_{5\frac{1}{2}} - 25753_{6\frac{1}{2}}$	15
5885.349	20	*MB*	16986.638	$13758^{\circ}_{1\frac{1}{2}} - 30745_{1\frac{1}{2}}$	22	5943.856	6	*MB*	16819.435		
5886.084	7	*MB*	16984.517			5945.436	8	*MB*	16814.966	$12466^{\circ}_{1\frac{1}{2}} - 29281_{2\frac{1}{2}}$	22
5886.649	5	*MB*	16982.887	$11742^{\circ}_{5\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−15	5946.235	8	*MB*	16812.706	$15803_{4\frac{1}{2}} - 32616^{\circ}_{4\frac{1}{2}}$	−2
5887.550	9	*MB*	16980.288	$10924^{\circ}_{4\frac{1}{2}} - 27905_{4\frac{1}{2}}$	7	5948.724	8	*MB*	16805.672	$10035^{\circ}_{5\frac{1}{2}} - 26841_{4\frac{1}{2}}$	0
5889.046	8	*MB*	16975.974	$25753_{6\frac{1}{2}} - 42729^{\circ}_{5\frac{1}{2}}$	20	5949.254	2	*MB*	16804.174		
				$19136^{\circ}_{2\frac{1}{2}} - 36112_{3\frac{1}{2}}$	−22	5952.040	3	*MB*	16796.309		
5889.627	20	*MB*	16974.299	$15517^{\circ}_{6\frac{1}{2}} - 32492_{5\frac{1}{2}}$	34	5952.222	7	*MB*	16795.795		
				$14049_{1\frac{1}{2}} - 31024^{\circ}_{2\frac{1}{2}}$	−15	5952.365	7	*MB*	16795.392	$10454^{\circ}_{1\frac{1}{2}} - 27249_{2\frac{1}{2}}$	−4
5894.424	3	*MB*	16960.486	$13784^{\circ}_{1\frac{1}{2}} - 30745_{1\frac{1}{2}}$	34	5952.511	5	*MB*	16794.980	$13012^{\circ}_{2\frac{1}{2}} - 29807_{3\frac{1}{2}}$	−2
5894.834	20	*MB*	16959.306	$27934_{4\frac{1}{2}} - 44893^{\circ}_{3\frac{1}{2}}$	5	5954.386	3	*MB*	16789.691	$19136^{\circ}_{2\frac{1}{2}} - 35925_{3\frac{1}{2}}$	34
				$25753_{6\frac{1}{2}} - 42712^{\circ}_{6\frac{1}{2}}$	−10	5955.446	3	*MB*	16786.703	$10646_{5\frac{1}{2}} - 27432^{\circ}_{4\frac{1}{2}}$	−8
5895.018	15	*MB*	16958.777	$16152_{3\frac{1}{2}} - 33111^{\circ}_{3\frac{1}{2}}$	−8	5956.146	3	*MB*	16784.730	$7878^{\circ}_{3\frac{1}{2}} - 24663_{4\frac{1}{2}}$	3
5895.677	12	*MB*	16956.881	$11340^{\circ}_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	6	5957.282	7	*MB*	16781.529	$11949^{\circ}_{3\frac{1}{2}} - 28730_{3\frac{1}{2}}$	7
5897.627	6	*MB*	16951.274	$9316_{3\frac{1}{2}} - 26268^{\circ}_{3\frac{1}{2}}$	−16	5959.688	70	*MB*	16774.755	$13117_{4\frac{1}{2}} - 29892^{\circ}_{3\frac{1}{2}}$	0

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
5960.697	15	*MB*	16771.915	$14252_{3\frac{1}{2}} - 31024^{\circ}_{2\frac{1}{2}}$	17	6045.865	12	*MB*	16535.652	$17000_{3\frac{1}{2}} - 33535^{\circ}_{3\frac{1}{2}}$	23
5963.373	10b	*MB*	16764.389	$14387_{4\frac{1}{2}} - 31151^{\circ}_{5\frac{1}{2}}$	−32	6048.306	3	*MB*	16528.978	$4844^{\circ}_{1\frac{1}{2}} - 21373_{1\frac{1}{2}}$	0
5966.131	20	*MB*	16756.639	$15859_{4\frac{1}{2}} - 32616^{\circ}_{4\frac{1}{2}}$	−16	6051.584	15	*MB*	16520.025	$28117_{7\frac{1}{2}} - 44637^{\circ}_{6\frac{1}{2}}$	−3
5966.863	4	*MB*	16754.584	$7746^{\circ}_{2\frac{1}{2}} - 24500_{2\frac{1}{2}}$	13	6051.813	40	*MB*	16519.400	$1873^{\circ}_{3\frac{1}{2}} - 18393_{3\frac{1}{2}}$	7
5967.431	5	*MB*	16752.989	$14481^{\circ}_{2\frac{1}{2}} - 31234_{2\frac{1}{2}}$	40	6052.608	30	*MB*	16517.230	$14827_{3\frac{1}{2}} - 31344^{\circ}_{3\frac{1}{2}}$	25
										$11458_{5\frac{1}{2}} - 27975^{\circ}_{4\frac{1}{2}}$	−35
5968.057	20	*MB*	16751.232	$14404^{\circ}_{7\frac{1}{2}} - 31155_{6\frac{1}{2}}$	9						
5973.279	7	*MB*	16736.587	$11949^{\circ}_{3\frac{1}{2}} - 28685_{2\frac{1}{2}}$	19	6055.164	5	*MB*	16510.258		
5974.567	12	*MB*	16732.979	$16152_{3\frac{1}{2}} - 32885^{\circ}_{2\frac{1}{2}}$	−10	6056.460	20	*MB*	16506.725	$13659^{\circ}_{4\frac{1}{2}} - 30166_{3\frac{1}{2}}$	−2
5974.760	10	*MB*	16732.439	$10646_{5\frac{1}{2}} - 27378^{\circ}_{5\frac{1}{2}}$	−5	6057.354	20	*MB*	16504.289		
5975.298	8	*MB*	16730.932	$13217_{3\frac{1}{2}} - 29948^{\circ}_{2\frac{1}{2}}$	−5	6060.719	12	*MB*	16495.125	$16545_{5\frac{1}{2}} - 33040^{\circ}_{4\frac{1}{2}}$	41
5975.824	150	*MB*	16729.460	$10703_{4\frac{1}{2}} - 27432^{\circ}_{4\frac{1}{2}}$	−16	6064.186	1	*MB*	16485.695	$11325^{\circ}_{2\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−19
5977.048	3	*MB*	16726.034	$14481^{\circ}_{2\frac{1}{2}} - 31207_{3\frac{1}{2}}$	37	6067.908	7	*MB*	16475.583	$13659^{\circ}_{4\frac{1}{2}} - 30134_{5\frac{1}{2}}$	2
5978.454	10	*MB*	16722.100			6069.290	10	*MB*	16471.831	$11340^{\circ}_{3\frac{1}{2}} - 27812_{2\frac{1}{2}}$	31
5980.004	6	*MB*	16717.766	$9634^{\circ}_{1\frac{1}{2}} - 26351_{0\frac{1}{2}}$	41	6069.625	15	*MB*	16470.922	$11340^{\circ}_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	24
5980.119	8	*MB*	16717.444	$6549^{\circ}_{2\frac{1}{2}} - 23267_{3\frac{1}{2}}$	2	6069.820	8	*MB*	16470.393		
5980.589	9	*MB*	16716.131	$10798^{\circ}_{2\frac{1}{2}} - 27514_{3\frac{1}{2}}$	26	6072.306	12	*MB*	16463.650	$16152_{3\frac{1}{2}} - 32616^{\circ}_{4\frac{1}{2}}$	8
5981.026	7	*MB*	16714.909	$14625_{5\frac{1}{2}} - 31340^{\circ}_{6\frac{1}{2}}$	19	6075.185	12	*MB*	16455.848	$13436_{2\frac{1}{2}} - 29892^{\circ}_{3\frac{1}{2}}$	25
5985.206	9	*MB*	16703.236	$16159^{\circ}_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	5	6077.550	15	*MB*	16449.445	$9316_{3\frac{1}{2}} - 25766^{\circ}_{4\frac{1}{2}}$	2
5990.414	7	*MB*	16688.714	$14481^{\circ}_{2\frac{1}{2}} - 31170_{1\frac{1}{2}}$	0	6078.299	6	*MB*	16447.418		
5991.001	4	*MB*	16687.079	$12751^{\circ}_{5\frac{1}{2}} - 29438_{5\frac{1}{2}}$	44	6079.307	15	*MB*	16444.690	$13675_{2\frac{1}{2}} - 30120^{\circ}_{1\frac{1}{2}}$	7
5991.144	8	*MB*	16686.681	$27950_{5\frac{1}{2}} - 44637^{\circ}_{6\frac{1}{2}}$	24	6080.904	5	*MB*	16440.372	$7713^{\circ}_{4\frac{1}{2}} - 24153_{3\frac{1}{2}}$	−4
5993.287	10	*MB*	16680.715	$13268_{2\frac{1}{2}} - 29948^{\circ}_{2\frac{1}{2}}$	19	6082.074	25	*MB*	16437.209	$15529_{2\frac{1}{2}} - 31966^{\circ}_{2\frac{1}{2}}$	37
5993.908	4	*MB*	16678.986	$6521^{\circ}_{1\frac{1}{2}} - 23200_{2\frac{1}{2}}$	−12	6084.435	5	*MB*	16430.831	$16454_{2\frac{1}{2}} - 32885^{\circ}_{2\frac{1}{2}}$	19
5995.261	100	*MB*	16675.222	$10703_{4\frac{1}{2}} - 27378^{\circ}_{5\frac{1}{2}}$	12	6084.981	8	*MB*	16429.357	$14315^{\circ}_{0\frac{1}{2}} - 30745_{1\frac{1}{2}}$	3
5995.446	60	*MB*	16674.708	$13217_{3\frac{1}{2}} - 29892^{\circ}_{3\frac{1}{2}}$	7	6087.046	7	*MB*	16423.783	$11387^{\circ}_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	18
5997.029	40	*MB*	16670.306	$16192^{\circ}_{4\frac{1}{2}} - 32862_{3\frac{1}{2}}$	5	6089.364	20	*MB*	16417.531	$14252_{3\frac{1}{2}} - 30669^{\circ}_{4\frac{1}{2}}$	7
5998.321	2	*MB*	16666.716	$13758^{\circ}_{1\frac{1}{2}} - 30425_{2\frac{1}{2}}$	37	6090.972	20	*MB*	16413.197	$15822_{3\frac{1}{2}} - 32235^{\circ}_{3\frac{1}{2}}$	17
6004.186	3	*MB*	16650.435	$6549^{\circ}_{2\frac{1}{2}} - 23200_{2\frac{1}{2}}$	13	6098.327	100	*MB*	16393.402	$14276_{5\frac{1}{2}} - 30669^{\circ}_{4\frac{1}{2}}$	−1
6004.320	3	*MB*	16650.064			6100.104	25	*MB*	16388.626	$11949^{\circ}_{3\frac{1}{2}} - 28337_{2\frac{1}{2}}$	1
6007.816	7	*MB*	16640.375	$17171^{\circ}_{5\frac{1}{2}} - 33811_{4\frac{1}{2}}$	53	6101.237	8	*MB*	16385.583	$11949^{\circ}_{3\frac{1}{2}} - 28334_{4\frac{1}{2}}$	16
6010.251	4	*MB*	16633.633	$18393_{3\frac{1}{2}} - 35026^{\circ}_{4\frac{1}{2}}$	17	6102.328	5	*MB*	16382.653	$6521^{\circ}_{1\frac{1}{2}} - 22903_{1\frac{1}{2}}$	12
6010.596	8	*MB*	16632.679	$13117_{4\frac{1}{2}} - 29750^{\circ}_{5\frac{1}{2}}$	54	6102.760	20	*MB*	16381.494	$7259^{\circ}_{3\frac{1}{2}} - 23640_{4\frac{1}{2}}$	6
6013.559	20	*MB*	16624.483	$13268_{2\frac{1}{2}} - 29892^{\circ}_{3\frac{1}{2}}$	25	6103.949	5	*MB*	16378.303	$15235_{1\frac{1}{2}} - 31613^{\circ}_{0\frac{1}{2}}$	49
6015.104	4	*MB*	16620.213			6104.848	20	*MB*	16375.891	$15859_{4\frac{1}{2}} - 32235^{\circ}_{3\frac{1}{2}}$	15
6016.315	10	*MB*	16616.868	$13503_{0\frac{1}{2}} - 30120^{\circ}_{1\frac{1}{2}}$	−29	6108.745	50	*MB*	16365.444	$13527_{4\frac{1}{2}} - 29892^{\circ}_{3\frac{1}{2}}$	6
6018.352	3	*MB*	16611.244	$5964^{\circ}_{3\frac{1}{2}} - 22576_{2\frac{1}{2}}$	−29	6112.984	6	*MB*	16354.096	$6549^{\circ}_{2\frac{1}{2}} - 22903_{1\frac{1}{2}}$	30
6018.912	9	*MB*	16609.698	$16192^{\circ}_{4\frac{1}{2}} - 32802_{5\frac{1}{2}}$	0	6115.154	15	*MB*	16348.293	$11949^{\circ}_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	9
6022.367	12	*MB*	16600.170	$24500_{2\frac{1}{2}} - 41100^{\circ}_{2\frac{1}{2}}$	−5	6119.454	8	*MB*	16336.805	$17571_{4\frac{1}{2}} - 33908^{\circ}_{4\frac{1}{2}}$	13
6024.575	6	*MB*	16594.086	$11340^{\circ}_{3\frac{1}{2}} - 27934_{4\frac{1}{2}}$	46	6120.694	9	*MB*	16333.496		
6029.149	15	*MB*	16581.497	$7059^{\circ}_{4\frac{1}{2}} - 23640_{4\frac{1}{2}}$	6	6124.768	8	*MB*	16322.631	$18704_{5\frac{1}{2}} - 35026^{\circ}_{4\frac{1}{2}}$	0
6032.131	10	*MB*	16573.300	$15565^{\circ}_{2\frac{1}{2}} - 32138_{2\frac{1}{2}}$	22	6126.116	25	*MB*	16319.039	$16545_{5\frac{1}{2}} - 32864^{\circ}_{5\frac{1}{2}}$	31
6033.256	3	*MB*	16570.209	$19946^{\circ}_{1\frac{1}{2}} - 36516_{1\frac{1}{2}}$	−20	6128.767	6	*MB*	16311.981		
6033.577	50	*MB*	16569.328	$15803_{4\frac{1}{2}} - 32372^{\circ}_{4\frac{1}{2}}$	17	6130.884	2	*MB*	16306.348	$7202^{\circ}_{2\frac{1}{2}} - 23508_{1\frac{1}{2}}$	−2
6034.199	70	*MB*	16567.620	$11759_{5\frac{1}{2}} - 28327^{\circ}_{5\frac{1}{2}}$	16	6132.002	40	*MB*	16303.375	$14827_{3\frac{1}{2}} - 31130^{\circ}_{3\frac{1}{2}}$	15
6035.476	70	*MB*	16564.114	$13027_{6\frac{1}{2}} - 29591^{\circ}_{6\frac{1}{2}}$	0	6134.580	15	*MB*	16296.524	$14727_{1\frac{1}{2}} - 31024^{\circ}_{2\frac{1}{2}}$	−11
6037.709	5	*MB*	16557.988	$16268_{1\frac{1}{2}} - 32826^{\circ}_{1\frac{1}{2}}$	−6	6136.564	20	*MB*	16291.255	$13515^{\circ}_{3\frac{1}{2}} - 29807_{3\frac{1}{2}}$	30
6038.025	6	*MB*	16557.122	$16159^{\circ}_{3\frac{1}{2}} - 32716_{2\frac{1}{2}}$	11	6138.535	6	*MB*	16286.024	$15565^{\circ}_{2\frac{1}{2}} - 31851_{2\frac{1}{2}}$	47
6040.416	6	*MB*	16550.568	$15822_{3\frac{1}{2}} - 32372^{\circ}_{4\frac{1}{2}}$	6	6139.173	12	*MB*	16284.332	$14739_{2\frac{1}{2}} - 31024^{\circ}_{2\frac{1}{2}}$	17
6042.226	1	*MB*	16545.610	$10641^{\circ}_{2\frac{1}{2}} - 27187_{3\frac{1}{2}}$	5	6139.822	10	*MB*	16282.610	$14387_{4\frac{1}{2}} - 30669^{\circ}_{4\frac{1}{2}}$	21
6043.378	250	*MB*	16542.456	$9725_{3\frac{1}{2}} - 26268^{\circ}_{3\frac{1}{2}}$	−13	6140.215	10	*MB*	16281.568	$24819_{3\frac{1}{2}} - 41100^{\circ}_{2\frac{1}{2}}$	−29

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
6140.523	6	*MB*	16280.752	$12057°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	45	6239.643	8	*MB*	16022.126		
6141.328	9	*MB*	16278.618	$3703°_{3\frac{1}{2}} - 19982_{4\frac{1}{2}}$	25	6241.448	12	*MB*	16017.492	$15134_{4\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	8
6143.369	70	*MB*	16273.209	$13675_{2\frac{1}{2}} - 29948°_{2\frac{1}{2}}$	18	6241.991	10	*MB*	16016.099	$13027_{6\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	3
6145.060	7	*MB*	16268.731	$12365°_{4\frac{1}{2}} - 28634_{5\frac{1}{2}}$	22	6242.372	12	*MB*	16015.121	$8804°_{4\frac{1}{2}} - 24819_{3\frac{1}{2}}$	11
6148.204	3	*MB*	16260.412	$8402°_{3\frac{1}{2}} - 24663_{4\frac{1}{2}}$	25	6243.407	4	*MB*	16012.466	$987°_{4\frac{1}{2}} - 17000_{3\frac{1}{2}}$	70
6150.703	7	*MB*	16253.806	$29908_{4\frac{1}{2}} - 46162°_{4\frac{1}{2}}$	18	6243.946	10	*MB*	16011.084	$2382°_{4\frac{1}{2}} - 18393_{3\frac{1}{2}}$	3
				$16159°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	−3	6248.758	5	*MB*	15998.754		
6151.265	25	*MB*	16252.321	$12097_{3\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	15	6250.180	5	*MB*	15995.115		
6152.293	15	*MB*	16249.605	$13659°_{4\frac{1}{2}} - 29908_{4\frac{1}{2}}$	30	6250.496	6	*MB*	15994.306		
6157.605	8	*MB*	16235.587	$13027_{6\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	7	6250.750	5	*MB*	15993.656		
6157.673	4	*MB*	16235.408	$13758°_{1\frac{1}{2}} - 29994_{2\frac{1}{2}}$	37	6250.917	10	*MB*	15993.229	$15565°_{2\frac{1}{2}} - 31558_{3\frac{1}{2}}$	23
6162.711	15	*MB*	16222.136	$9723°_{4\frac{1}{2}} - 25945_{3\frac{1}{2}}$	75	6251.456	3	*MB*	15991.850		
6163.182	25	*MB*	16220.896	$16192°_{4\frac{1}{2}} - 32413_{3\frac{1}{2}}$	16	6252.474	10	*MB*	15989.246	$17000_{3\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	35
6163.389	10	*MB*	16220.351			6253.574	7	*MB*	15986.434	$7522°_{0\frac{1}{2}} - 23508_{1\frac{1}{2}}$	12
6164.407	20	*MB*	16217.672	$15529_{2\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	6	6253.951	5	*MB*	15985.470	$11949°_{3\frac{1}{2}} - 27934_{4\frac{1}{2}}$	21
6167.836	12	*MB*	16208.656	$11742°_{5\frac{1}{2}} - 27950_{5\frac{1}{2}}$	10	6260.216	8	*MB*	15969.472		
6167.983	6	*MB*	16208.270	$7059°_{4\frac{1}{2}} - 23267_{3\frac{1}{2}}$	−8	6260.417	10	*MB*	15968.960	$12365°_{4\frac{1}{2}} - 28334_{4\frac{1}{2}}$	10
6168.670	1	*MB*	16206.465			6261.050	10	*MB*	15967.345		
6169.803	7	*MB*	16203.489	$4737°_{2\frac{1}{2}} - 20940_{3\frac{1}{2}}$	23	6262.030	10	*MB*	15964.846	$7818°_{1\frac{1}{2}} - 23782_{2\frac{1}{2}}$	3
6171.260	5	*MB*	16199.663			6262.203	5	*MB*	15964.405	$11742°_{5\frac{1}{2}} - 27706_{6\frac{1}{2}}$	19
6172.458	6	*MB*	16196.519	$14827_{3\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	66	6262.278	4	*MB*	15964.214	$17571_{4\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	−20
6174.015	10	*MB*	16192.435	$11742°_{5\frac{1}{2}} - 27934_{4\frac{1}{2}}$	42	6262.965	2	*MB*	15962.463	$12762°_{4\frac{1}{2}} - 28725_{4\frac{1}{2}}$	−43
6180.069	25	*MB*	16176.573	$10641°_{2\frac{1}{2}} - 26817_{2\frac{1}{2}}$	75	6263.212	2	*MB*	15961.834		
6182.315	12	*MB*	16170.696	$15576_{1\frac{1}{2}} - 31747°_{1\frac{1}{2}}$	21	6265.073	3	*MB*	15957.092		
6183.942	25	*MB*	16166.441	$9778°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	32	6269.125	4	*MB*	15946.778		
6185.288	10	*MB*	16162.923	$11742°_{5\frac{1}{2}} - 27905_{4\frac{1}{2}}$	12	6271.300	3	*MB*	15941.248	$7259°_{3\frac{1}{2}} - 23200_{2\frac{1}{2}}$	−7
6189.335	6	*MB*	16152.355	$0°_{3\frac{1}{2}} - 16152_{3\frac{1}{2}}$	−21	6272.024	100	*MB*	15939.408	$12456_{3\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	4
6193.122	3	*MB*	16142.478	$19483_{2\frac{1}{2}} - 35625°_{3\frac{1}{2}}$	3	6275.089	5	*MB*	15931.622	$12365°_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	−44
6195.983	4	*MB*	16135.025			6275.727	5	*MB*	15930.003	$5010°_{2\frac{1}{2}} - 20940_{3\frac{1}{2}}$	34
6199.565	6	*MB*	16125.702	$16192°_{4\frac{1}{2}} - 32318_{3\frac{1}{2}}$	−6	6278.155	6	*MB*	15923.842	$11454_{6\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	28
6200.581	8	*MB*	16123.060	$2581°_{4\frac{1}{2}} - 18704_{5\frac{1}{2}}$	4	6279.115	8	*MB*	15921.408	$7278°_{1\frac{1}{2}} - 23200_{2\frac{1}{2}}$	0
6201.829	10	*MB*	16119.815	$3363°_{2\frac{1}{2}} - 19483_{2\frac{1}{2}}$	18	6281.592	10	*MB*	15915.129	$13758°_{1\frac{1}{2}} - 29673_{2\frac{1}{2}}$	30
6205.613	6	*MB*	16109.986			6281.954	4	*MB*	15914.212		
6205.764	5	*MB*	16109.594	$17300°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	7	6283.559	10	*MB*	15910.147	$15434_{2\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	18
6208.676	7	*MB*	16102.039	$16133_{2\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	−5	6283.990	1	*CK*	15909.056	$11340°_{3\frac{1}{2}} - 27249_{2\frac{1}{2}}$	−14
6209.358	2	*MB*	16100.270	$32989°_{3\frac{1}{2}} - 49089_{2\frac{1}{2}}$	2	6285.727	12	*MB*	15904.660	$7878°_{3\frac{1}{2}} - 23782_{2\frac{1}{2}}$	−2
6213.085	7	*MB*	16090.612	$5283°_{0\frac{1}{2}} - 21373_{1\frac{1}{2}}$	18	6286.568	7	*MB*	15902.532	$9778°_{2\frac{1}{2}} - 25681_{1\frac{1}{2}}$	30
6215.115	10	*MB*	16085.357	$22576_{2\frac{1}{2}} - 38661°_{1\frac{1}{2}}$	7	6287.906	5	*MB*	15899.148	$14049_{1\frac{1}{2}} - 29948°_{2\frac{1}{2}}$	−4
6216.079	15	*MB*	16082.862	$16152_{3\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	0	6290.404	7	*MB*	15892.835	$12456_{3\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	0
6217.600	5	*MB*	16078.928			6291.626	5	*MB*	15889.748		
6219.444	2	*MB*	16074.161			6291.932	4	*MB*	15888.975	$13784°_{1\frac{1}{2}} - 29673_{2\frac{1}{2}}$	39
6220.808	10	*MB*	16070.636	$14049_{1\frac{1}{2}} - 30120°_{1\frac{1}{2}}$	−8	6293.356	7	*MB*	15885.380	$17000_{3\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	20
6224.738	4	*MB*	16060.490			6296.142	10	*MB*	15878.351	$12097_{3\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	8
6225.392	7	*MB*	16058.803	$15281_{6\frac{1}{2}} - 31340°_{6\frac{1}{2}}$	12	6297.110	2	*MB*	15875.910		
6231.060	3	*MB*	16044.195	$14625_{5\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	−3	6299.484	60	*MB*	15869.927	$15281_{6\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	−4
6232.446	40	*MB*	16040.627	$9725_{3\frac{1}{2}} - 25766°_{4\frac{1}{2}}$	5	6299.809	5	*MB*	15869.108		
6233.278	7	*MB*	16038.486	$16159°_{3\frac{1}{2}} - 32197_{4\frac{1}{2}}$	40	6310.551	8	*MB*	15842.096	$14827_{3\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	17
6233.756	10	*MB*	16037.256	$15576_{1\frac{1}{2}} - 31613°_{0\frac{1}{2}}$	−8	6312.000	5	*MB*	15838.459	$10641°_{2\frac{1}{2}} - 26479_{1\frac{1}{2}}$	−24
6235.948	8	*MB*	16031.619	$13758°_{1\frac{1}{2}} - 29790_{0\frac{1}{2}}$	19	6312.612	10	*MB*	15836.923		
6236.377	5	*MB*	16030.516			6314.577	6	*MB*	15831.995		

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
6314.869	2	*MB*	15831.263			6378.502	4	*MB*	15673.329	$11759_{5\frac{1}{2}} - 27432°_{4\frac{1}{2}}$	14
6315.165	5	*MB*	15830.521	$10114°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	8	6379.670	5	*MB*	15670.460	$10274°_{3\frac{1}{2}} - 25945_{3\frac{1}{2}}$	35
6315.501	7	*MB*	15829.679	$9269°_{0\frac{1}{2}} - 25099_{1\frac{1}{2}}$	23	6380.884	5	*MB*	15667.478	$10684°_{0\frac{1}{2}} - 26351_{0\frac{1}{2}}$	9
6315.771	4	*MB*	15829.002			6381.228	5	*MB*	15666.634		
6318.549	10	*MB*	15822.043	$0°_{3\frac{1}{2}} - 15822_{3\frac{1}{2}}$	−15	6381.906	4	*MB*	15664.969	$13784°_{1\frac{1}{2}} - 29449_{1\frac{1}{2}}$	25
				$5118°_{2\frac{1}{2}} - 20940_{3\frac{1}{2}}$	10						
						6383.883	3	*MB*	15660.118		
6319.390	1	*MB*	15819.937			6385.323	8	*MB*	15656.587	$24819_{3\frac{1}{2}} - 40475°_{3\frac{1}{2}}$	−3
6321.261	12	*MB*	15815.255	$15529_{2\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	3	6388.350	6	*MB*	15649.168		
6321.372	8	*MB*	15814.977	$19483_{2\frac{1}{2}} - 35298°_{2\frac{1}{2}}$	12	6390.654	12	*MB*	15643.526	$19982_{4\frac{1}{2}} - 35625°_{3\frac{1}{2}}$	13
6321.612	10	*MB*	15814.377	$16152_{3\frac{1}{2}} - 31966°_{2\frac{1}{2}}$	6	6391.880	3	*MB*	15640.526	$14252_{3\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	27
6322.696	3	*MB*	15811.666			6392.773	15	*MB*	15638.341	$9723°_{4\frac{1}{2}} - 25361_{4\frac{1}{2}}$	2
6323.391	3	*MB*	15809.928			6393.022	50	*MB*	15637.732	$14097_{3\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	13
6323.577	5	*MB*	15809.463							$11742°_{5\frac{1}{2}} - 27379_{5\frac{1}{2}}$	28
6323.887	8	*MB*	15808.688			6394.201	4	*MB*	15634.848		
6324.753	5	*MB*	15806.523			6395.465	5	*MB*	15631.758	$19136°_{2\frac{1}{2}} - 34767_{1\frac{1}{2}}$	95
6324.918	3	*MB*	15806.111	$33811_{4\frac{1}{2}} - 49617°_{5\frac{1}{2}}$	−21	6398.199	5	*MB*	15625.079	$7278°_{1\frac{1}{2}} - 22903_{1\frac{1}{2}}$	27
6329.407	8	*MB*	15794.901	$14097_{3\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	−86	6398.459	7	*MB*	15624.444	$12326°_{6\frac{1}{2}} - 27950_{5\frac{1}{2}}$	−29
6330.923	8	*MB*	15791.119	$12326°_{6\frac{1}{2}} - 28117_{7\frac{1}{2}}$	17	6400.662	12	*MB*	15619.066	$30245_{4\frac{1}{2}} - 45864°_{5\frac{1}{2}}$	−5
6333.458	4	*MB*	15784.798	$19136°_{2\frac{1}{2}} - 34920_{3\frac{1}{2}}$	34					$11759_{5\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	18
6333.817	5	*MB*	15783.903			6401.203	7	*MB*	15617.746	$17976_{2\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	7
6335.117	7	*MB*	15780.664	$16454_{2\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	−19	6406.330	6	*MB*	15605.247	$15565°_{2\frac{1}{2}} - 31170_{1\frac{1}{2}}$	23
6337.603	3	*MB*	15774.474			6408.911	5	*MB*	15598.963		
6338.314	7	*MB*	15772.705	$6517°_{2\frac{1}{2}} - 22290_{1\frac{1}{2}}$	9	6412.850	15	*MB*	15589.382	$15434_{2\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	5
6342.331	5	*MB*	15762.715	$7746°_{2\frac{1}{2}} - 23508_{1\frac{1}{2}}$	20	6414.622	6	*MB*	15585.075	$12365°_{4\frac{1}{2}} - 27950_{5\frac{1}{2}}$	−9
6343.949	70	*MB*	15758.695	$2634°_{2\frac{1}{2}} - 18393_{3\frac{1}{2}}$	34	6415.377	1	*MB*	15583.241	$14481°_{2\frac{1}{2}} - 30065_{3\frac{1}{2}}$	7
6346.735	9	*MB*	15751.778	$2641°_{3\frac{1}{2}} - 18393_{3\frac{1}{2}}$	10	6416.404	7	*MB*	15580.747	$9778°_{2\frac{1}{2}} - 25359_{2\frac{1}{2}}$	47
6347.103	8	*MB*	15750.864	$8402°_{3\frac{1}{2}} - 24153_{3\frac{1}{2}}$	66	6420.026	7	*MB*	15571.957	$15517°_{6\frac{1}{2}} - 31089_{5\frac{1}{2}}$	−1
6348.750	7	*MB*	15746.778	$15593_{6\frac{1}{2}} - 31340°_{6\frac{1}{2}}$	45	6421.498	10	*MB*	15568.387	$23267_{3\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	4
6349.389	12	*MB*	15745.193	$16192°_{4\frac{1}{2}} - 31937_{3\frac{1}{2}}$	7	6422.916	12	*MB*	15564.950	$15281_{6\frac{1}{2}} - 30846°_{7\frac{1}{2}}$	−29
6349.554	4	*MB*	15744.784	$17300°_{3\frac{1}{2}} - 33045_{2\frac{1}{2}}$	0	6425.064	5	*MB*	15559.747	$11340°_{3\frac{1}{2}} - 26900_{3\frac{1}{2}}$	−8
6350.462	5	*MB*	15742.533			6425.289	25	*MB*	15559.202	$17976_{2\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	−20
6350.979	3	*MB*	15741.252	$25359_{2\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	6	6425.850	15	*MB*	15557.843	$15593_{6\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	−30
6355.899	5	*MB*	15729.067			6427.146	5	*MB*	15554.706		
6355.987	4	*MB*	15728.849			6427.343	6	*MB*	15554.229	$7713°_{4\frac{1}{2}} - 23267_{3\frac{1}{2}}$	−32
6356.242	5	*MB*	15728.218			6428.505	10	*MB*	15551.418	$12260°_{3\frac{1}{2}} - 27811_{3\frac{1}{2}}$	10
6356.295	4	*MB*	15728.087			6432.601	6	*MB*	15541.515	$15803_{4\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	−2
6361.274	5	*MB*	15715.776	$4266°_{3\frac{1}{2}} - 19982_{4\frac{1}{2}}$	−13	6432.986	4	*MB*	15540.585		
6361.365	4	*MB*	15715.552	$26817_{2\frac{1}{2}} - 42533°_{1\frac{1}{2}}$	29	6433.307	10	*MB*	15539.810	$17571_{4\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	48
6362.739	5	*MB*	15712.158			6433.495	15	*MB*	15539.356	$12365°_{4\frac{1}{2}} - 27905_{4\frac{1}{2}}$	5
6363.723	6	*MB*	15709.728			6434.672	6	*MB*	15536.513		
6367.070	7	*MB*	15701.470	$7202°_{2\frac{1}{2}} - 22903_{1\frac{1}{2}}$	25	6435.012	7	*MB*	15535.693	$32616°_{4\frac{1}{2}} - 48151_{4\frac{1}{2}}$	−26
6367.884	4	*MB*	15699.463			6435.364	8	*MB*	15534.843	$12762°_{4\frac{1}{2}} - 28297_{3\frac{1}{2}}$	11
6368.392	5	*MB*	15698.211			6435.961	3	*MB*	15533.402		
6368.999	6	*MB*	15696.715	$14252_{3\frac{1}{2}} - 29948°_{2\frac{1}{2}}$	−20	6440.352	15	*MB*	15522.811	$15822_{3\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	42
6369.167	12	*MB*	15696.301	$15434_{2\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	17	6440.554	8	*MB*	15522.324	$4459°_{3\frac{1}{2}} - 19982_{4\frac{1}{2}}$	10
6369.325	5	*MB*	15695.911			6441.979	10	*MB*	15518.891	$12456_{3\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	18
6369.597	3	*MB*	15695.241			6445.348	6	*MB*	15510.779	$19946°_{1\frac{1}{2}} - 35457_{1\frac{1}{2}}$	29
6371.115	60	*MB*	15691.502	$12704_{1\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	−13	6446.805	7	*MB*	15507.274	$13659°_{4\frac{1}{2}} - 29166_{4\frac{1}{2}}$	6
6371.371	7	*MB*	15690.871			6447.515	8	*MB*	15505.566	$14387_{4\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	1
6376.944	4	*MB*	15677.158	$19136°_{2\frac{1}{2}} - 34813_{2\frac{1}{2}}$	−19	6448.947	6	*MB*	15502.123	$14481°_{2\frac{1}{2}} - 29984_{1\frac{1}{2}}$	1

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
6449.503	7	*MB*	15500.787	$11340°_{3\frac{1}{2}}-26841_{4\frac{1}{2}}$	1	6595.307	1	*MB*	15158.110		
6452.120	6	*MB*	15494.500	$15529_{2\frac{1}{2}}-31024°_{2\frac{1}{2}}$	0	6595.437	2	*MB*	15157.811	$7746°_{2\frac{1}{2}}-22903_{1\frac{1}{2}}$	22
6452.976	3	*MB*	15492.444	$31937_{3\frac{1}{2}}-47430°_{3\frac{1}{2}}$	−86	6596.937	5	*MB*	15154.364		
6455.888	10	*MB*	15485.456	$15859_{4\frac{1}{2}}-31344°_{3\frac{1}{2}}$	−8	6597.036	7	*MB*	15154.137	$11325°_{2\frac{1}{2}}-26479_{1\frac{1}{2}}$	−7
6459.122	7	*MB*	15477.703	$15565°_{2\frac{1}{2}}-31043_{2\frac{1}{2}}$	13	6597.567	5	*MB*	15152.917	$14739_{2\frac{1}{2}}-29892°_{3\frac{1}{2}}$	1
6459.251	6	*MB*	15477.394	$11340°_{3\frac{1}{2}}-26817_{2\frac{1}{2}}$	56	6597.679	2	*MB*	15152.660	$23508_{1\frac{1}{2}}-38661°_{1\frac{1}{2}}$	20
6460.018	4	*MB*	15475.556			6602.193	10	*MB*	15142.300	$18393_{3\frac{1}{2}}-33535°_{3\frac{1}{2}}$	−8
6460.561	3	*MB*	15474.256	$14276_{5\frac{1}{2}}-29750°_{5\frac{1}{2}}$	7	6606.859	30	*MB*	15131.606	$13217_{3\frac{1}{2}}-28349°_{3\frac{1}{2}}$	0
6462.168	4	*MB*	15470.407	$33079_{3\frac{1}{2}}-48549°_{4\frac{1}{2}}$	−70	6607.577	5	*MB*	15129.962	$12057°_{2\frac{1}{2}}-27187_{3\frac{1}{2}}$	22
6462.781	12	*MB*	15468.940	$17571_{4\frac{1}{2}}-33040°_{4\frac{1}{2}}$	−11	6608.464	6	*MB*	15127.931	$13268_{2\frac{1}{2}}-28396°_{2\frac{1}{2}}$	0
6464.284	7	*MB*	15465.343	$9634°_{1\frac{1}{2}}-25099_{1\frac{1}{2}}$	48	6609.728	15	*MB*	15125.038	$14625_{5\frac{1}{2}}-29750°_{5\frac{1}{2}}$	−5
6466.882	40	*MB*	15459.130	$14276_{5\frac{1}{2}}-29735°_{4\frac{1}{2}}$	15	6611.807	10	*MB*	15120.282	$10646_{5\frac{1}{2}}-25766°_{4\frac{1}{2}}$	−2
6468.966	12	*MB*	15454.150	$7746°_{2\frac{1}{2}}-23200_{2\frac{1}{2}}$	4	6614.450	10	*MB*	15114.241	$25361_{4\frac{1}{2}}-40475°_{3\frac{1}{2}}$	−9
6494.724	10	*MB*	15392.860	$14727_{1\frac{1}{2}}-30120°_{1\frac{1}{2}}$	−5	6615.546	3	*MB*	15111.737		
6496.354	5	*MB*	15388.997	$7878°_{3\frac{1}{2}}-23267_{3\frac{1}{2}}$	−25	6616.354	10	*MB*	15109.891	$14625_{5\frac{1}{2}}-29735°_{4\frac{1}{2}}$	−18
6500.793	4	*MB*	15378.489			6621.080	5	*MB*	15099.106	$11742°_{5\frac{1}{2}}-26841_{4\frac{1}{2}}$	−32
6502.835	4	*MB*	15373.660	$7202°_{2\frac{1}{2}}-22576_{2\frac{1}{2}}$	19	6624.408	10	*MB*	15091.521	$8175°_{2\frac{1}{2}}-23267_{3\frac{1}{2}}$	33
6503.265	25	*MB*	15372.644	$17000_{3\frac{1}{2}}-32372°_{4\frac{1}{2}}$	30	6626.047	3	*MB*	15087.788	$7202°_{2\frac{1}{2}}-22290_{1\frac{1}{2}}$	2
6507.157	25	*MB*	15363.449	$14387_{4\frac{1}{2}}-29750°_{5\frac{1}{2}}$	14	6626.510	10	*MB*	15086.733	$10274°_{3\frac{1}{2}}-25361_{4\frac{1}{2}}$	31
6513.590	50	*MB*	15348.276	$14387_{4\frac{1}{2}}-29735°_{4\frac{1}{2}}$	−24	6628.857	20	*MB*	15081.392	$13268_{2\frac{1}{2}}-28349°_{3\frac{1}{2}}$	28
6515.337	7	*MB*	15344.161	$11007°_{1\frac{1}{2}}-26351_{0\frac{1}{2}}$	49	6630.316	6	*MB*	15078.073		
6520.127	5	*MB*	15332.888	$27379_{5\frac{1}{2}}-42712°_{6\frac{1}{2}}$	27	6633.088	6	*MB*	15071.772	$15565°_{2\frac{1}{2}}-30637_{2\frac{1}{2}}$	35
6523.415	8	*MB*	15325.160	$14481°_{2\frac{1}{2}}-29807_{3\frac{1}{2}}$	12	6634.920	8	*MB*	15067.611		
6527.481	3	*MB*	15315.614	$14276_{5\frac{1}{2}}-29591°_{6\frac{1}{2}}$	39	6636.047	12	*MB*	15065.052	$14827_{3\frac{1}{2}}-29892°_{3\frac{1}{2}}$	−1
6533.107	5	*MB*	15302.425	$9198°_{3\frac{1}{2}}-24500_{2\frac{1}{2}}$	−4	6641.475	6	*MB*	15052.739	$23782_{2\frac{1}{2}}-38835°_{2\frac{1}{2}}$	−3
6533.945	3	*MB*	15300.462	$11949°_{3\frac{1}{2}}-27249_{2\frac{1}{2}}$	−17	6643.180	8	*MB*	15048.876	$12762°_{4\frac{1}{2}}-27811_{3\frac{1}{2}}$	21
6537.194	12	*MB*	15292.858	$17571_{4\frac{1}{2}}-32864°_{5\frac{1}{2}}$	−18	6647.376	9	*MB*	15039.377	$4910°_{5\frac{1}{2}}-19950_{6\frac{1}{2}}$	0
6537.493	15	*MB*	15292.159	$15859_{4\frac{1}{2}}-31151°_{5\frac{1}{2}}$	−11	6651.330	10	*MB*	15030.436		
6539.015	5	*MB*	15288.599			6652.725	60	*MB*	15027.285	$12326°_{6\frac{1}{2}}-27353_{7\frac{1}{2}}$	32
6558.600	8	*MB*	15242.946	$32802_{5\frac{1}{2}}-48045°_{6\frac{1}{2}}$	11	6652.967	20	*MB*	15026.738	$17171°_{5\frac{1}{2}}-32197_{4\frac{1}{2}}$	1
6567.893	8	*MB*	15221.378	$14727_{1\frac{1}{2}}-29948°_{2\frac{1}{2}}$	4	6654.707	20	*MB*	15022.809	$27706_{6\frac{1}{2}}-42729°_{5\frac{1}{2}}$	−6
6569.861	2	*MB*	15216.819	$4266°_{3\frac{1}{2}}-19483_{2\frac{1}{2}}$	−8	6656.900	10	*MB*	15017.860	$17300°_{3\frac{1}{2}}-32318_{3\frac{1}{2}}$	−4
6570.794	7	*MB*	15214.658	$4266°_{3\frac{1}{2}}-19481_{4\frac{1}{2}}$	15	6658.543	7	*MB*	15014.155	$12365°_{4\frac{1}{2}}-27379_{5\frac{1}{2}}$	12
6571.120	2	*MB*	15213.903			6659.143	8	*MB*	15012.802	$17976_{2\frac{1}{2}}-32989°_{3\frac{1}{2}}$	−2
6573.166	8	*MB*	15209.168	$14739_{2\frac{1}{2}}-29948°_{2\frac{1}{2}}$	15	6661.207	5	*MB*	15008.150	$19920°_{3\frac{1}{2}}-34928_{4\frac{1}{2}}$	−5
				$13117_{4\frac{1}{2}}-28327°_{5\frac{1}{2}}$	19					$2563°_{5\frac{1}{2}}-17571_{4\frac{1}{2}}$	−17
6575.442	9	*MB*	15203.903	$18704_{5\frac{1}{2}}-33908°_{4\frac{1}{2}}$	23	6662.085	6	*MB*	15006.172	$27706_{6\frac{1}{2}}-42712°_{6\frac{1}{2}}$	−6
6576.245	2	*MB*	15202.047	$15822_{3\frac{1}{2}}-31024°_{2\frac{1}{2}}$	30	6665.717	6	*MB*	14997.996	$5942°_{3\frac{1}{2}}-20940_{3\frac{1}{2}}$	−44
6576.774	8	*MB*	15200.824	$18393_{3\frac{1}{2}}-33594°_{2\frac{1}{2}}$	0	6665.812	10	*MB*	14997.782	$16133_{2\frac{1}{2}}-31130°_{3\frac{1}{2}}$	−6
6577.512	10	*MB*	15199.119	$12751°_{5\frac{1}{2}}-27950_{5\frac{1}{2}}$	10	6670.602	10	*MB*	14987.012	$14276_{5\frac{1}{2}}-29263°_{5\frac{1}{2}}$	−27
6578.376	4	*MB*	15197.122	$19136°_{2\frac{1}{2}}-34333_{2\frac{1}{2}}$	49	6675.528	30	*MB*	14975.953	$5964°_{3\frac{1}{2}}-20940_{3\frac{1}{2}}$	10
6580.390	7	*MB*	15192.471	$16152_{3\frac{1}{2}}-31344°_{3\frac{1}{2}}$	20	6677.342	4	*MB*	14971.885	$4511°_{2\frac{1}{2}}-19483_{2\frac{1}{2}}$	−82
6580.651	8	*MB*	15191.869	$14481°_{2\frac{1}{2}}-29673_{2\frac{1}{2}}$	29	6678.465	20	*MB*	14969.367		
6581.237	2	*MB*	15190.516			6679.148	7	*MB*	14967.837	$14481°_{2\frac{1}{2}}-29449_{1\frac{1}{2}}$	−10
6584.565	6	*MB*	15182.838	$12751°_{5\frac{1}{2}}-27934_{4\frac{1}{2}}$	−17	6684.828	10	*MB*	14955.119	$9198°_{3\frac{1}{2}}-24153_{3\frac{1}{2}}$	−20
6584.849	4	*MB*	15182.183	$33148_{2\frac{1}{2}}-48330°_{3\frac{1}{2}}$	−17	6686.027	4	*MB*	14952.437	$32507_{1\frac{1}{2}}-47459°_{2\frac{1}{2}}$	−14
6585.794	6	*MB*	15180.005			6691.726	5	*MB*	14939.703	$9723°_{4\frac{1}{2}}-24663_{4\frac{1}{2}}$	−16
6589.287	2	*MB*	15171.958	$12762°_{4\frac{1}{2}}-27934_{4\frac{1}{2}}$	−38	6692.348	5	*MB*	14938.314	$17475°_{4\frac{1}{2}}-32413_{3\frac{1}{2}}$	−8
6589.340	3	*MB*	15171.836	$14963°_{5\frac{1}{2}}-30134_{5\frac{1}{2}}$	26	6694.919	3	*MB*	14932.578	$18147°_{2\frac{1}{2}}-33079_{3\frac{1}{2}}$	71
6594.258	6	*MB*	15160.521	$4322°_{2\frac{1}{2}}-19483_{2\frac{1}{2}}$	4	6702.324	6	*MB*	14916.080	$16159°_{3\frac{1}{2}}-31075_{4\frac{1}{2}}$	13

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
6704.521	40	*MB*	14911.192	$19950_{6\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	6	6828.588	3	*MB*	14640.276	$12260°_{3\frac{1}{2}} - 26900_{3\frac{1}{2}}$	10
6705.514	12	*MB*	14908.984	$17976_{2\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	30	6829.378	10	*MB*	14638.582	$4844°_{1\frac{1}{2}} - 19483_{2\frac{1}{2}}$	1
6706.040	25	*MB*	14907.814	$14827_{3\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	24	6829.729	25	*MB*	14637.830	$14625_{5\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	−4
6708.097	8	*MB*	14903.243	$5651°_{5\frac{1}{2}} - 20554_{5\frac{1}{2}}$	4	6834.235	20	*MB*	14628.179	$12751°_{5\frac{1}{2}} - 27379_{5\frac{1}{2}}$	12
6713.675	9	*MB*	14890.861	$16133_{2\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	−20	6834.620	3	*MB*	14627.355	$10035°_{5\frac{1}{2}} - 24663_{4\frac{1}{2}}$	11
6716.405	12	*MB*	14884.808	$15235_{1\frac{1}{2}} - 30120°_{1\frac{1}{2}}$	−18	6836.641	4	*MB*	14623.031	$8280°_{2\frac{1}{2}} - 22903_{1\frac{1}{2}}$	3
6718.858	5	*MB*	14879.374	$19982_{4\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	35	6839.411	7	*MB*	14617.108	$15517°_{6\frac{1}{2}} - 30134_{5\frac{1}{2}}$	−29
6719.241	6	*MB*	14878.526	$23782_{2\frac{1}{2}} - 38661°_{1\frac{1}{2}}$	−2	6842.919	5	*MB*	14609.615	$15510_{0\frac{1}{2}} - 30120°_{1\frac{1}{2}}$	−4
6720.277	40	*MB*	14876.232	$14387_{4\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	6	6844.482	20	*MB*	14606.279	$16545_{5\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	14
6722.321	10	*MB*	14871.709	$16152_{3\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	10	6846.788	20	*MB*	14601.359	$15134_{4\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	−3
6728.674	30b	*MB*	14857.667	$13117_{4\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	−29	6847.150	2	*CC*	14600.588	$15565°_{2\frac{1}{2}} - 30166_{3\frac{1}{2}}$	−48
6733.218	25	*MB*	14847.641	$15822_{3\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	−1	6849.633	20	*MB*	14595.295	$28117_{7\frac{1}{2}} - 42712°_{6\frac{1}{2}}$	4
6735.245	7	*MB*	14843.172	$17475°_{4\frac{1}{2}} - 32318_{3\frac{1}{2}}$	20	6854.188	4	*MB*	14585.595	$5969°_{5\frac{1}{2}} - 20554_{5\frac{1}{2}}$	7
6737.420	7	*MB*	14838.380	$17300°_{3\frac{1}{2}} - 32138_{2\frac{1}{2}}$	−7	6861.746	7	*MB*	14569.530	$16454_{2\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	9
6738.351	5	*MB*	14836.330	$8804°_{4\frac{1}{2}} - 23640_{4\frac{1}{2}}$	−8	6857.237	7	*MB*	14557.880	$12260°_{3\frac{1}{2}} - 26817_{2\frac{1}{2}}$	33
6741.222	5	*MB*	14830.012	$7746°_{2\frac{1}{2}} - 22576_{2\frac{1}{2}}$	27	6869.552	7	*MB*	14552.975	$13784°_{1\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−4
6742.311	3	*MB*	14827.617	$0°_{3\frac{1}{2}} - 14827_{3\frac{1}{2}}$	−5	6872.177	10	*MB*	14547.416	$14481°_{2\frac{1}{2}} - 29029_{1\frac{1}{2}}$	−6
6743.817	15	*MB*	14824.305	$27905_{4\frac{1}{2}} - 42729°_{5\frac{1}{2}}$	15	6873.436	8	*MB*	14544.751	$5437°_{3\frac{1}{2}} - 19982_{4\frac{1}{2}}$	−13
6744.081	9	*MB*	14823.725	$6549°_{2\frac{1}{2}} - 21373_{1\frac{1}{2}}$	10	6873.844	9	*MB*	14543.888	$15576_{1\frac{1}{2}} - 30120°_{1\frac{1}{2}}$	50
6744.713	35	*MB*	14822.336	$13527_{4\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	−6	6878.252	9	*MB*	14534.567	$12365°_{4\frac{1}{2}} - 26900_{3\frac{1}{2}}$	19
6748.152	5	*MB*	14814.782	$5969°_{5\frac{1}{2}} - 20783_{5\frac{1}{2}}$	−2	6898.450	40	*MB*	14492.012	$18393_{3\frac{1}{2}} - 32885°_{2\frac{1}{2}}$	−27
6750.177	12	*MB*	14810.338	$15859_{4\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	0	6905.301	10	*MB*	14477.634	$16159°_{3\frac{1}{2}} - 30637_{2\frac{1}{2}}$	13
6754.964	6	*MB*	14799.843	$13527_{4\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	11	6907.818	30	*MB*	14472.359	$20554_{5\frac{1}{2}} - 35026°_{4\frac{1}{2}}$	11
6755.133	10b	*MB*	14799.472	$14481°_{2\frac{1}{2}} - 29281_{2\frac{1}{2}}$	28					$5010°_{2\frac{1}{2}} - 19483_{2\frac{1}{2}}$	4
				$3593°_{4\frac{1}{2}} - 18393_{3\frac{1}{2}}$	27	6912.233	8	*MB*	14463.115	$8804°_{4\frac{1}{2}} - 23267_{3\frac{1}{2}}$	−11
6755.959	4	*MB*	14797.663	$8402°_{3\frac{1}{2}} - 23200_{2\frac{1}{2}}$	0	6912.465	5	*MB*	14462.629	$17475°_{4\frac{1}{2}} - 31937_{3\frac{1}{2}}$	0
6757.113	9	*MB*	14795.136	$16545_{5\frac{1}{2}} - 31340°_{6\frac{1}{2}}$	12	6914.060	8	*MB*	14459.293		
6760.240	2	*CC*	14788.292			6915.668	8	*MB*	14455.931	$17475°_{4\frac{1}{2}} - 31930_{4\frac{1}{2}}$	18
6760.940	3	*CC*	14786.761			6918.966	7	*MB*	14449.041	$1410°_{4\frac{1}{2}} - 15859_{4\frac{1}{2}}$	−17
6763.291	5	*MB*	14781.621	$13515°_{3\frac{1}{2}} - 28297_{3\frac{1}{2}}$	1	6919.272	30	*MB*	14448.401	$13527_{4\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	22
6769.308	9	*MB*	14768.482			6928.033	8	*MB*	14430.131	$9723°_{4\frac{1}{2}} - 24153_{3\frac{1}{2}}$	0
6769.735	10	*MB*	14767.551	$14276_{5\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	−4	6931.348	10	*MB*	14423.229	$6517°_{2\frac{1}{2}} - 20940_{3\frac{1}{2}}$	9
6770.965	6	*MB*	14764.868			6933.686	10	*MB*	14418.366	$14625_{5\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	15
6772.313	9	*MB*	14761.929	$27950_{5\frac{1}{2}} - 42712°_{6\frac{1}{2}}$	10	6935.267	5	*MB*	14415.079	$10684°_{0\frac{1}{2}} - 25099_{1\frac{1}{2}}$	38
6773.337	15	*MB*	14759.697	$17171°_{5\frac{1}{2}} - 31930_{4\frac{1}{2}}$	7	6936.682	10	*MB*	14412.138	$10088°_{1\frac{1}{2}} - 24500_{2\frac{1}{2}}$	23
6774.276	50	*MB*	14757.652	$13217_{3\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	9	6943.557	10	*MB*	14397.869	$3995°_{3\frac{1}{2}} - 18393_{3\frac{1}{2}}$	2
6775.323	4	*MB*	14755.371	$16268_{1\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	−31	6944.079	10	*MB*	14396.786	$17171°_{5\frac{1}{2}} - 31568_{4\frac{1}{2}}$	12
6776.850	1	*CC*	14752.046	$12762°_{4\frac{1}{2}} - 27514_{3\frac{1}{2}}$	27	6946.898	6	*MB*	14390.944	$6549°_{2\frac{1}{2}} - 20940_{3\frac{1}{2}}$	13
6777.891	10	*MB*	14749.781	$29673_{2\frac{1}{2}} - 44423°_{1\frac{1}{2}}$	−23	6948.758	6	*MB*	14387.092	$0°_{3\frac{1}{2}} - 14387_{4\frac{1}{2}}$	−19
6782.482	2	*MB*	14739.797	$0°_{3\frac{1}{2}} - 14739_{2\frac{1}{2}}$	36	6949.342	4	*MB*	14385.883	$10114°_{2\frac{1}{2}} - 24500_{2\frac{1}{2}}$	10
6785.021	4	*MB*	14734.281	$8169°_{1\frac{1}{2}} - 22903_{1\frac{1}{2}}$	5	6954.762	15	*MB*	14374.672	$19920°_{3\frac{1}{2}} - 34295_{4\frac{1}{2}}$	35
6791.410	2	*CC*	14720.420	$13675_{2\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	−7	6959.727	9	*MB*	14364.417	$5118°_{2\frac{1}{2}} - 19483_{2\frac{1}{2}}$	−1
6792.620	4	*CC*	14717.798	$18393_{3\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	−37	6960.372	5	*MB*	14363.086	$15529_{2\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	−14
6793.538	7	*MB*	14715.809	$18147°_{2\frac{1}{2}} - 32862_{3\frac{1}{2}}$	47	6963.145	25	*MB*	14357.366	$20940_{3\frac{1}{2}} - 35298°_{2\frac{1}{2}}$	16
6794.681	15	*MB*	14713.333	$15235_{1\frac{1}{2}} - 29948°_{2\frac{1}{2}}$	−1	6969.228	12	*MB*	14344.835	$17000_{3\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	14
6801.838	5	*MB*	14697.852	$7878°_{3\frac{1}{2}} - 22576_{2\frac{1}{2}}$	10	6973.503	70	*MB*	14336.041	$18704_{5\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	1
6807.833	50b	*MB*	14684.909	$20940_{3\frac{1}{2}} - 35625°_{3\frac{1}{2}}$	48	6976.042	7	*MB*	14330.823	$5651°_{5\frac{1}{2}} - 19982_{4\frac{1}{2}}$	−6
6809.062	12	*MB*	14682.259	$24153_{3\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	−8	6983.290	9	*MB*	14315.949		
6811.776	10	*MB*	14676.409	$16454_{2\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	−18	6983.821	50	*MB*	14314.861	$13117_{4\frac{1}{2}} - 27432°_{4\frac{1}{2}}$	1
6812.963	9	*MB*	14673.852	$13675_{2\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	−7	6986.074	60	*MB*	14310.244	$15281_{6\frac{1}{2}} - 29591°_{6\frac{1}{2}}$	−26

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
6987.676	9	*MB*	14306.964	$20554_{5\frac{1}{2}} - 34861°_{5\frac{1}{2}}$	34	7190.008	10	*MB*	13904.358	$17171°_{5\frac{1}{2}} - 31075_{4\frac{1}{2}}$	0
6992.564	12	*MB*	14296.963	$31568_{4\frac{1}{2}} - 45864°_{5\frac{1}{2}}$	32	7196.814	30	*MB*	13891.209	$15859_{4\frac{1}{2}} - 29750°_{5\frac{1}{2}}$	25
6995.205	4	*MB*	14291.565	$13659°_{4\frac{1}{2}} - 27950_{5\frac{1}{2}}$	3	7198.338	5	*MB*	13888.268	$12057°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−20
6999.045	10	*MB*	14283.724	$32413_{3\frac{1}{2}} - 46697°_{4\frac{1}{2}}$	−13					$13012°_{2\frac{1}{2}} - 26900_{3\frac{1}{2}}$	9
7001.624	4	*MB*	14278.463	$1873°_{3\frac{1}{2}} - 16152_{3\frac{1}{2}}$	20	7201.557	50	*MB*	13882.060	$4511°_{2\frac{1}{2}} - 18393_{3\frac{1}{2}}$	−9
7002.351	4	*MB*	14276.980			7204.668	10	*MB*	13876.066	$15859_{4\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	16
7010.420	4	*MB*	14260.548	$13117_{4\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	−44	7207.672	10	*MB*	13870.282	$4523°_{4\frac{1}{2}} - 18393_{3\frac{1}{2}}$	−11
7014.546	4	*MB*	14252.160	$0°_{3\frac{1}{2}} - 14252_{3\frac{1}{2}}$	−17	7208.978	2	*MB*	13867.770	$3703°_{3\frac{1}{2}} - 17571_{4\frac{1}{2}}$	−36
7021.356	4	*MB*	14238.336			7211.000	30	*MB*	13863.881	$38194°_{4\frac{1}{2}} - 52058_{4\frac{1}{2}}$	22
7025.901	10	*MB*	14229.126	$15565°_{2\frac{1}{2}} - 29794_{3\frac{1}{2}}$	29	7215.176	12	*MB*	13855.857	$14481°_{2\frac{1}{2}} - 28337_{2\frac{1}{2}}$	−26
7027.560	4	*MB*	14225.767	$10274°_{3\frac{1}{2}} - 24500_{2\frac{1}{2}}$	−17	7215.454	10	*MB*	13855.323	$13659°_{4\frac{1}{2}} - 27514_{3\frac{1}{2}}$	−7
7031.030	10	*CC*	14218.746			7217.555	30	*MB*	13851.290	$27249_{2\frac{1}{2}} - 41100°_{2\frac{1}{2}}$	27
7038.572	5	*MB*	14203.510	$14963°_{5\frac{1}{2}} - 29166_{4\frac{1}{2}}$	14					$13527_{4\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	14
7054.761	5	*MB*	14170.917	$12097_{3\frac{1}{2}} - 26268°_{3\frac{1}{2}}$	−9	7235.713	15	*MB*	13816.530		
7058.678	15	*MB*	14163.053	$2382°_{4\frac{1}{2}} - 16545_{5\frac{1}{2}}$	30	7238.382	90	*MB*	13811.436	$12456_{3\frac{1}{2}} - 26268°_{3\frac{1}{2}}$	−20
				$5819°_{4\frac{1}{2}} - 19982_{4\frac{1}{2}}$	−20						
						7264.272	50	*MB*	13762.212	$15281_{6\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	−39
7061.747	50	*MB*	14156.898	$15593_{6\frac{1}{2}} - 29750°_{5\frac{1}{2}}$	11	7274.554	30	*MB*	13742.760	$17300°_{3\frac{1}{2}} - 31043_{2\frac{1}{2}}$	−39
7064.115	5	*MB*	14152.153	$13659°_{4\frac{1}{2}} - 27811_{3\frac{1}{2}}$	−13	7284.781	50	*MB*	13723.467	$14252_{3\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	26
7068.190	1	*CC*	14143.994	$14252_{3\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	22	7297.635	25	*MB*	13699.295	$14276_{5\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	−25
7079.892	4	*MB*	14120.616	$8169°_{1\frac{1}{2}} - 22290_{1\frac{1}{2}}$	0	7301.417	40	*MB*	13692.199	$14404°_{7\frac{1}{2}} - 28096_{8\frac{1}{2}}$	19
7084.420	2	*CC*	14111.591			7306.990	5	*MB*	13681.756	$7259°_{3\frac{1}{2}} - 20940_{3\frac{1}{2}}$	−7
7084.754	10	*MB*	14110.925	$19483_{2\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	−1	7313.456	90	*MB*	13669.660	$15593_{6\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	−17
7086.348	70	*MB*	14107.751	$17232_{7\frac{1}{2}} - 31340°_{6\frac{1}{2}}$	10	7314.031	7	*MB*	13668.585	$14727_{1\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	−24
7091.551	3	*MB*	14097.401	$14252_{3\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	−2	7317.608	10	*MB*	13661.904	$5819°_{4\frac{1}{2}} - 19481_{4\frac{1}{2}}$	−22
7093.747	2	*MB*	14093.037	$17475°_{4\frac{1}{2}} - 31568_{4\frac{1}{2}}$	41	7320.980	1	*CC*	13655.611	$1873°_{3\frac{1}{2}} - 15529_{2\frac{1}{2}}$	−30
7095.469	5	*MB*	14089.616	$12751°_{5\frac{1}{2}} - 26841_{4\frac{1}{2}}$	15	7328.656	6	*MB*	13641.308		
7097.233	6	*MB*	14086.114	$20940_{3\frac{1}{2}} - 35026°_{4\frac{1}{2}}$	10	7330.501	30	*MB*	13637.875	$987°_{4\frac{1}{2}} - 14625_{5\frac{1}{2}}$	−16
7105.045	10	*MB*	14070.627	$15822_{3\frac{1}{2}} - 29892°_{3\frac{1}{2}}$	9	7332.054	15	*MB*	13634.986	$16159°_{3\frac{1}{2}} - 29794_{3\frac{1}{2}}$	5
				$4322°_{2\frac{1}{2}} - 18393_{3\frac{1}{2}}$	8	7332.576	5	*MB*	13634.016	$2634°_{2\frac{1}{2}} - 16268_{1\frac{1}{2}}$	9
7110.250	3	*CC*	14060.327	$19946°_{1\frac{1}{2}} - 34006_{0\frac{1}{2}}$	73	7334.682	80	*MB*	13630.101	$19481_{4\frac{1}{2}} - 33111°_{3\frac{1}{2}}$	−21
7111.900	7	*MB*	14057.065			7336.124	4	*MB*	13627.422	$7746°_{2\frac{1}{2}} - 21373_{1\frac{1}{2}}$	−15
7115.077	30	*MB*	14050.788	$14276_{5\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	15	7340.433	12	*MB*	13619.422	$11742°_{5\frac{1}{2}} - 25361_{4\frac{1}{2}}$	−6
7118.720	2	*CC*	14043.597	$5437°_{3\frac{1}{2}} - 19481_{4\frac{1}{2}}$	−20	7343.024	20	*MB*	13614.617	$16192°_{4\frac{1}{2}} - 29807_{3\frac{1}{2}}$	5
7120.857	10	*MB*	14039.383	$5942°_{3\frac{1}{2}} - 19982_{4\frac{1}{2}}$	−5	7348.284	20	*MB*	13604.871	$10035°_{5\frac{1}{2}} - 23640_{4\frac{1}{2}}$	19
7121.262	9	*MB*	14038.584	$10114°_{2\frac{1}{2}} - 24153_{3\frac{1}{2}}$	2	7360.100	2	*MB*	13583.030	$16152_{3\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	−5
7132.071	25	*MB*	14017.308	$5964°_{3\frac{1}{2}} - 19982_{4\frac{1}{2}}$	18	7361.695	40	*MB*	13580.087	$17571_{4\frac{1}{2}} - 31151°_{5\frac{1}{2}}$	−45
7132.529	8	*MB*	14016.408	$24819_{3\frac{1}{2}} - 38835°_{2\frac{1}{2}}$	9	7365.301	50	*MB*	13573.438	$18393_{3\frac{1}{2}} - 31966°_{2\frac{1}{2}}$	17
7134.177	9	*MB*	14013.171	$5969°_{5\frac{1}{2}} - 19982_{4\frac{1}{2}}$	−8	7367.984	5	*MB*	13568.496	$14827_{3\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	−30
7142.820	8	*MB*	13996.214	$11949°_{3\frac{1}{2}} - 25945_{3\frac{1}{2}}$	8	7372.976	15	*MB*	13559.309	$19481_{4\frac{1}{2}} - 33040°_{4\frac{1}{2}}$	−3
7150.228	80	*MB*	13981.714	$15281_{6\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	−21	7376.177	80	*MB*	13553.425	$19982_{4\frac{1}{2}} - 33535°_{3\frac{1}{2}}$	−23
7154.207	10	*MB*	13973.937	$11387°_{3\frac{1}{2}} - 25361_{4\frac{1}{2}}$	−5	7390.457	50	*MB*	13527.237	$0°_{3\frac{1}{2}} - 13527_{4\frac{1}{2}}$	−1
7156.993	70	*MB*	13968.498			7396.543	5	*MB*	13516.106	$5964°_{3\frac{1}{2}} - 19481_{4\frac{1}{2}}$	−37
7165.468	7	*MB*	13951.977			7402.091	40	*MB*	13505.976	$19483_{2\frac{1}{2}} - 32989°_{3\frac{1}{2}}$	−16
7167.916	8	*MB*	13947.212	$15803_{4\frac{1}{2}} - 29750°_{5\frac{1}{2}}$	−24	7406.180	10	*MB*	13498.519	$2634°_{2\frac{1}{2}} - 16133_{2\frac{1}{2}}$	−8
7175.000	30	*MB*	13933.442	$4459°_{3\frac{1}{2}} - 18393_{3\frac{1}{2}}$	−12	7411.345	9	*MB*	13489.112	$19920°_{3\frac{1}{2}} - 33409_{3\frac{1}{2}}$	28
7175.716	30	*MB*	13932.051	$15803_{4\frac{1}{2}} - 29735°_{4\frac{1}{2}}$	−51	7412.524	9	*MB*	13486.966		
7178.515	3	*MB*	13926.619			7417.951	50	*MB*	13477.099	$2382°_{4\frac{1}{2}} - 15859_{4\frac{1}{2}}$	−17
7178.845	30	*MB*	13925.979	$19982_{4\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	−26	7425.198	10	*MB*	13463.946	$15565°_{2\frac{1}{2}} - 29029_{1\frac{1}{2}}$	13
7186.205	70	*MB*	13911.716	$18704_{5\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	10					$31130°_{3\frac{1}{2}} - 44594_{2\frac{1}{2}}$	1
7189.408	60	*MB*	13905.518	$13527_{4\frac{1}{2}} - 27432°_{4\frac{1}{2}}$	−24	7427.354	40	*MB*	13460.038	$15803_{4\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	10

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
7438.988	60	*MB*	13438.987	$3793°_{6\frac{1}{2}} - 17232_{7\frac{1}{2}}$	−30	7689.168	80	*MB*	13001.730	$12751°_{5\frac{1}{2}} - 25753_{6\frac{1}{2}}$	19
7448.930	5	*MB*	13421.050	$2382°_{4\frac{1}{2}} - 15803_{4\frac{1}{2}}$	−13	7690.194	60	*MB*	12999.995	$13268_{2\frac{1}{2}} - 26268°_{3\frac{1}{2}}$	10
7458.418	50	*MB*	13403.977	$15859_{4\frac{1}{2}} - 29263°_{5\frac{1}{2}}$	2	7695.271	3	*MB*	12991.418	$14387_{4\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	15
7460.920	3	*CC*	13399.482	$987°_{4\frac{1}{2}} - 14387_{4\frac{1}{2}}$	−18	7701.503	3	*MB*	12980.906	$2595°_{1\frac{1}{2}} - 15576_{1\frac{1}{2}}$	−17
7470.420	10	*MB*	13382.443	$5010°_{2\frac{1}{2}} - 18393_{3\frac{1}{2}}$	−13	7707.060	7	*MB*	12971.546	$14963°_{5\frac{1}{2}} - 27934_{4\frac{1}{2}}$	8
7473.815	10	*MB*	13376.364			7710.583	6	*MB*	12965.619	$6517°_{2\frac{1}{2}} - 19483_{2\frac{1}{2}}$	13
7474.430	2	*CC*	13375.263			7711.742	15	*MB*	12963.671	$17171°_{5\frac{1}{2}} - 30134_{5\frac{1}{2}}$	6
7486.574	90	*MB*	13353.567	$20554_{5\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	−29	7712.808	3	*MB*	12961.879	$6521°_{1\frac{1}{2}} - 19483_{2\frac{1}{2}}$	−13
7491.981	10	*MB*	13343.930	$6638°_{4\frac{1}{2}} - 19982_{4\frac{1}{2}}$	1	7717.680	20	*MB*	12953.697	$1873°_{3\frac{1}{2}} - 14827_{3\frac{1}{2}}$	8
7492.283	5	*MB*	13343.392	$19483_{2\frac{1}{2}} - 32826°_{1\frac{1}{2}}$	−50	7724.609	40	*MB*	12942.077	$14963°_{5\frac{1}{2}} - 27905_{4\frac{1}{2}}$	20
7502.341	4	*MB*	13325.503	$13515°_{3\frac{1}{2}} - 26841_{4\frac{1}{2}}$	−27	7724.690	4	*CC*	12941.941	$19920°_{3\frac{1}{2}} - 32862_{3\frac{1}{2}}$	−12
7504.058	10	*MB*	13322.454	$11340°_{3\frac{1}{2}} - 24663_{4\frac{1}{2}}$	−2	7729.469	6	*MB*	12933.940	$2595°_{1\frac{1}{2}} - 15529_{2\frac{1}{2}}$	8
7511.309	50	*MB*	13309.594	$12456_{3\frac{1}{2}} - 25766°_{4\frac{1}{2}}$	−14	7729.857	20	*MB*	12933.290	$13012°_{2\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−10
7527.680	4	*CC*	13280.648							$6549°_{2\frac{1}{2}} - 19483_{2\frac{1}{2}}$	−26
7533.700	2	*CC*	13270.036			7735.945	20	*MB*	12923.112	$7059°_{4\frac{1}{2}} - 19982_{4\frac{1}{2}}$	−2
7557.301	7	*MB*	13228.595	$10924°_{4\frac{1}{2}} - 24153_{3\frac{1}{2}}$	5	7740.719	20	*MB*	12915.142	$2595°_{1\frac{1}{2}} - 15510_{0\frac{1}{2}}$	0
7557.792	15	*MB*	13227.736	$7713°_{4\frac{1}{2}} - 20940_{3\frac{1}{2}}$	−13	7740.862	5	*MB*	12914.904	$15434_{2\frac{1}{2}} - 28349°_{3\frac{1}{2}}$	21
7564.954	30	*MB*	13215.212	$1410°_{4\frac{1}{2}} - 14625_{5\frac{1}{2}}$	13	7741.432	70	*MB*	12913.953	$19950_{6\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	15
7577.685	60	*MB*	13193.010	$15134_{4\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	−10	7746.648	30	*MB*	12905.257	$3363°_{2\frac{1}{2}} - 16268_{1\frac{1}{2}}$	12
7580.906	10	*MB*	13187.405	$2634°_{2\frac{1}{2}} - 15822_{3\frac{1}{2}}$	12	7752.127	4	*MB*	12896.136	$18147°_{2\frac{1}{2}} - 31043_{2\frac{1}{2}}$	31
7583.573	6	*MB*	13182.767	$12762°_{4\frac{1}{2}} - 25945_{3\frac{1}{2}}$	12	7752.864	40	*MB*	12894.910	$2634°_{2\frac{1}{2}} - 15529_{2\frac{1}{2}}$	1
7584.819	30	*MB*	13180.601	$14252_{3\frac{1}{2}} - 27432°_{4\frac{1}{2}}$	−2	7758.701	6	*MB*	12885.209	$31766_{1\frac{1}{2}} - 44651°_{1\frac{1}{2}}$	16
7588.061	10	*MB*	13174.970	$11325°_{2\frac{1}{2}} - 24500_{2\frac{1}{2}}$	−4					$5819°_{4\frac{1}{2}} - 18704_{5\frac{1}{2}}$	10
7589.618	5	*MB*	13172.267	$16192°_{4\frac{1}{2}} - 29364_{3\frac{1}{2}}$	−6	7785.102	20	*MB*	12841.513	$7713°_{4\frac{1}{2}} - 20554_{5\frac{1}{2}}$	6
7593.312	10	*MB*	13165.859	$12326°_{6\frac{1}{2}} - 25492_{5\frac{1}{2}}$	25	7791.267	3	*MB*	12831.352	$13436_{2\frac{1}{2}} - 26268°_{3\frac{1}{2}}$	3
7596.364	10	*MB*	13160.569	$15235_{1\frac{1}{2}} - 28396°_{2\frac{1}{2}}$	−1	7795.464	5	*MB*	12824.444	$10684°_{0\frac{1}{2}} - 23508_{1\frac{1}{2}}$	5
7611.299	10	*MB*	13134.746	$34295_{4\frac{1}{2}} - 47430°_{3\frac{1}{2}}$	12	7809.344	9	*MB*	12801.650	$19136°_{2\frac{1}{2}} - 31937_{3\frac{1}{2}}$	21
				$4165_{4\frac{1}{2}} - 17300°_{3\frac{1}{2}}$	−13	7828.177	4	*MB*	12770.852	$17475°_{4\frac{1}{2}} - 30245_{4\frac{1}{2}}$	−2
7614.370	2	*CC*	13129.448			7828.639	10	*MB*	12770.099	$19946°_{1\frac{1}{2}} - 32716_{2\frac{1}{2}}$	20
7616.120	40	*MB*	13126.432	$12365°_{4\frac{1}{2}} - 25492_{5\frac{1}{2}}$	−12	7828.845	4	*MB*	12769.763	$3363°_{2\frac{1}{2}} - 16133_{2\frac{1}{2}}$	−3
7617.299	20	*MB*	13124.400	$20783_{5\frac{1}{2}} - 33908°_{4\frac{1}{2}}$	0	7831.790	10	*MB*	12764.961	$8175°_{2\frac{1}{2}} - 20940_{3\frac{1}{2}}$	−14
7618.785	10	*MB*	13121.840	$16159°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	2	7838.383	80	*MB*	12754.224	$19481_{4\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	25
7621.060	10	*MB*	13117.923	$0°_{3\frac{1}{2}} - 13117_{4\frac{1}{2}}$	1	7839.727	4	*MB*	12752.038	$19483_{2\frac{1}{2}} - 32235°_{3\frac{1}{2}}$	24
7621.742	10	*MB*	13116.749	$15517°_{6\frac{1}{2}} - 28634_{5\frac{1}{2}}$	5	7844.940	90	*MB*	12743.564	$14963°_{5\frac{1}{2}} - 27706_{6\frac{1}{2}}$	33
7630.197	30	*MB*	13102.215	$14276_{5\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	−1	7846.835	8	*MB*	12740.486	$12751°_{5\frac{1}{2}} - 25492_{5\frac{1}{2}}$	17
7634.357	6	*MB*	13095.075	$2140°_{0\frac{1}{2}} - 15235_{1\frac{1}{2}}$	−11	7848.581	6	*MB*	12737.652	$18393_{3\frac{1}{2}} - 31130°_{3\frac{1}{2}}$	−3
7635.756	10	*MB*	13092.676	$8280°_{2\frac{1}{2}} - 21373_{1\frac{1}{2}}$	0					$17171°_{5\frac{1}{2}} - 29908_{4\frac{1}{2}}$	−6
7636.666	10	*MB*	13091.116	$6389°_{4\frac{1}{2}} - 19481_{4\frac{1}{2}}$	18	7850.015	90	*MB*	12735.325	$5969°_{5\frac{1}{2}} - 18704_{5\frac{1}{2}}$	19
				$3363°_{2\frac{1}{2}} - 16454_{2\frac{1}{2}}$	−11	7851.185	80	*MB*	12733.427	$15593_{6\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	16
7648.586	9	*MB*	13070.714	$7713°_{4\frac{1}{2}} - 20783_{5\frac{1}{2}}$	11	7853.515	7	*MB*	12729.650	$12762°_{4\frac{1}{2}} - 25492_{5\frac{1}{2}}$	40
7658.022	9	*MB*	13054.609	$10454°_{1\frac{1}{2}} - 23508_{1\frac{1}{2}}$	1	7857.542	100	*MB*	12723.126	$7259°_{3\frac{1}{2}} - 19982_{4\frac{1}{2}}$	14
7658.992	10	*MB*	13052.955	$5651°_{5\frac{1}{2}} - 18704_{5\frac{1}{2}}$	0	7877.057	10	*MB*	12691.605	$19946°_{1\frac{1}{2}} - 32638_{1\frac{1}{2}}$	8
7660.617	20	*MB*	13050.187	$13217_{3\frac{1}{2}} - 26268°_{3\frac{1}{2}}$	−39	7889.761	4	*MB*	12671.169	$8702°_{1\frac{1}{2}} - 21373_{1\frac{1}{2}}$	−9
7662.710	40	*MB*	13046.622	$16545_{5\frac{1}{2}} - 29591°_{6\frac{1}{2}}$	18	7896.469	4	*MB*	12660.405	$4910°_{5\frac{1}{2}} - 17571_{4\frac{1}{2}}$	−32
7663.388	60	*MB*	13045.468	$15281_{6\frac{1}{2}} - 28327°_{5\frac{1}{2}}$	0	7898.958	70	*MB*	12656.416	$7293°_{6\frac{1}{2}} - 19950_{6\frac{1}{2}}$	14
7668.416	5	*MB*	13036.914	$6913°_{6\frac{1}{2}} - 19950_{6\frac{1}{2}}$	−33	7900.874	10	*MB*	12653.347	$20940_{3\frac{1}{2}} - 33594°_{2\frac{1}{2}}$	34
7670.633	4	*MB*	13033.146	$13784°_{1\frac{1}{2}} - 26817_{2\frac{1}{2}}$	44	7903.929	30	*MB*	12648.456	$13117_{4\frac{1}{2}} - 25766°_{4\frac{1}{2}}$	23
7670.766	20	*MB*	13032.920			7909.260	20	*MB*	12639.931	$2595°_{1\frac{1}{2}} - 15235_{1\frac{1}{2}}$	−3
7672.250	20	*MB*	13030.399	$2563°_{5\frac{1}{2}} - 15593_{6\frac{1}{2}}$	−27	7913.089	10	*MB*	12633.814	$19982_{4\frac{1}{2}} - 32616°_{4\frac{1}{2}}$	−17
7675.322	8	*MB*	13025.184			7915.015	7	*MB*	12630.740	$18393_{3\frac{1}{2}} - 31024°_{2\frac{1}{2}}$	−8

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
7926.005	4	*MB*	12613.227			8224.288	30	*MB*	12155.766	$3703°_{3\frac{1}{2}} - 15859_{4\frac{1}{2}}$	−2
7927.340	3	*MB*	12611.103			8229.206	1	*MB*	12148.501		
7934.496	80	*MB*	12599.729	$15517°_{6\frac{1}{2}} - 28117_{7\frac{1}{2}}$	−17	8233.411	9	*MB*	12142.296	$16192°_{4\frac{1}{2}} - 28334_{4\frac{1}{2}}$	7
7934.922	15	*MB*	12599.053	$12762°_{4\frac{1}{2}} - 25361_{4\frac{1}{2}}$	20	8236.501	10	*MB*	12137.741	$3995°_{3\frac{1}{2}} - 16133_{2\frac{1}{2}}$	7
7939.064	30	*MB*	12592.479	$13675_{2\frac{1}{2}} - 26268°_{3\frac{1}{2}}$	−1	8240.472	20	*MB*	12131.892	$2595°_{1\frac{1}{2}} - 14727_{1\frac{1}{2}}$	−3
7960.076	4	*MB*	12559.239	$12260°_{3\frac{1}{2}} - 24819_{3\frac{1}{2}}$	−6	8241.550	150	*MB*	12130.305	$987°_{4\frac{1}{2}} - 13117_{4\frac{1}{2}}$	−5
7960.299	10	*MB*	12558.888	$10641°_{2\frac{1}{2}} - 23200_{2\frac{1}{2}}$	0	8247.247	3	*MB*	12121.926	$10454°_{1\frac{1}{2}} - 22576_{2\frac{1}{2}}$	28
7964.180	10	*MB*	12552.768	$2581°_{4\frac{1}{2}} - 15134_{4\frac{1}{2}}$	−24	8249.598	20	*MB*	12118.471	$3703°_{3\frac{1}{2}} - 15822_{3\frac{1}{2}}$	7
7966.960	25	*MB*	12548.387	$13217_{3\frac{1}{2}} - 25766°_{4\frac{1}{2}}$	9	8250.648	100	*MB*	12116.929	$1410°_{4\frac{1}{2}} - 13527_{4\frac{1}{2}}$	−5
7972.536	40	*MB*	12539.611	$987°_{4\frac{1}{2}} - 13527_{4\frac{1}{2}}$	−16	8251.104	4	*MB*	12116.260	$15859_{4\frac{1}{2}} - 27975°_{4\frac{1}{2}}$	4
7973.147	1	*MB*	12538.650			8258.712	10	*MB*	12105.098	$2634°_{2\frac{1}{2}} - 14739_{2\frac{1}{2}}$	3
7973.446	4	*MB*	12538.180	$8402°_{3\frac{1}{2}} - 20940_{3\frac{1}{2}}$	9	8262.392	3	*MB*	12099.707	$3703°_{3\frac{1}{2}} - 15803_{4\frac{1}{2}}$	−8
7989.391	10	*MB*	12513.157	$1873°_{3\frac{1}{2}} - 14387_{4\frac{1}{2}}$	−20	8263.405	20	*MB*	12098.223	$2641°_{3\frac{1}{2}} - 14739_{2\frac{1}{2}}$	21
7997.099	5	*MB*	12501.096	$11007°_{1\frac{1}{2}} - 23508_{1\frac{1}{2}}$	15	8264.290	5	*MB*	12096.928	$15281_{6\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	15
7998.690	6	*MB*	12498.610	$16545_{5\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	25	8264.670	5	*MB*	12096.371	$12057°_{2\frac{1}{2}} - 24153_{3\frac{1}{2}}$	13
8002.560	9	*CC*	12492.565	$19920°_{3\frac{1}{2}} - 32413_{3\frac{1}{2}}$	32	8268.451	20	*MB*	12090.840		
8002.690	10	*CC*	12492.362	$32638_{1\frac{1}{2}} - 45130°_{2\frac{1}{2}}$	−1	8281.854	4	*MB*	12071.273	$3363°_{2\frac{1}{2}} - 15434_{2\frac{1}{2}}$	1
8005.766	4	*MB*	12487.563	$10088°_{1\frac{1}{2}} - 22576_{2\frac{1}{2}}$	33	8291.851	5	*MB*	12056.719	$12762°_{4\frac{1}{2}} - 24819_{3\frac{1}{2}}$	26
8017.806	6	*MB*	12468.811	$10798°_{2\frac{1}{2}} - 23267_{3\frac{1}{2}}$	15	8305.280	8	*MB*	12037.225		
8024.355	2	*MB*	12458.634	$3363°_{2\frac{1}{2}} - 15822_{3\frac{1}{2}}$	2	8307.273	3	*MB*	12034.337	$12466°_{1\frac{1}{2}} - 24500_{2\frac{1}{2}}$	11
8025.570	80	*MB*	12456.748	$0°_{3\frac{1}{2}} - 12456_{3\frac{1}{2}}$	2	8312.384	15	*MB*	12026.937	$4165_{4\frac{1}{2}} - 16192°_{4\frac{1}{2}}$	21
8030.703	30	*MB*	12448.786	$3703°_{3\frac{1}{2}} - 16152_{3\frac{1}{2}}$	3	8327.669	50	*MB*	12004.863	$2382°_{4\frac{1}{2}} - 14387_{4\frac{1}{2}}$	−2
8032.900	10	*MB*	12445.381	$2382°_{4\frac{1}{2}} - 14827_{3\frac{1}{2}}$	5	8328.711	4	*MB*	12003.361	$6389°_{4\frac{1}{2}} - 18393_{3\frac{1}{2}}$	−23
8034.018	8	*MB*	12443.650	$12057°_{2\frac{1}{2}} - 24500_{2\frac{1}{2}}$	1	8338.603	4	*MB*	11989.121	$5010°_{2\frac{1}{2}} - 17000_{3\frac{1}{2}}$	−15
8040.835	12	*MB*	12433.100	$15517°_{6\frac{1}{2}} - 27950_{5\frac{1}{2}}$	−18	8344.209	4	*MB*	11981.067	$17300°_{3\frac{1}{2}} - 29281_{2\frac{1}{2}}$	3
8043.096	20	*MB*	12429.605	$3703°_{3\frac{1}{2}} - 16133_{2\frac{1}{2}}$	5	8355.149	70	*MB*	11965.379	$18704_{5\frac{1}{2}} - 30669°_{4\frac{1}{2}}$	−9
8048.049	4	*MB*	12421.955	$7059°_{4\frac{1}{2}} - 19481_{4\frac{1}{2}}$	−12	8358.004	10	*MB*	11961.292	$5513_{5\frac{1}{2}} - 17475°_{4\frac{1}{2}}$	−21
8068.510	30	*MB*	12390.455	$19982_{4\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	21	8360.323	10	*MB*	11957.974		
8076.479	20	*MB*	12378.229	$1873°_{3\frac{1}{2}} - 14252_{3\frac{1}{2}}$	−14	8381.054	10	*MB*	11928.395		
8078.472	7	*MB*	12375.175			8382.209	5	*MB*	11926.752	$11340°_{3\frac{1}{2}} - 23267_{3\frac{1}{2}}$	0
8088.896	80	*MB*	12359.228	$17232_{7\frac{1}{2}} - 29591°_{6\frac{1}{2}}$	7	8394.505	20	*MB*	11909.282	$2140°_{0\frac{1}{2}} - 14049_{1\frac{1}{2}}$	13
8090.660	10	*CC*	12356.533			8402.256	10	*MB*	11898.296	$11742°_{5\frac{1}{2}} - 23640_{4\frac{1}{2}}$	−21
8103.679	20	*MB*	12336.682			8404.121	50	*MB*	11895.655	$5675°_{4\frac{1}{2}} - 17571_{4\frac{1}{2}}$	17
8118.362	10	*MB*	12314.370	$6389°_{4\frac{1}{2}} - 18704_{5\frac{1}{2}}$	0	8405.253	50	*MB*	11894.053	$2382°_{4\frac{1}{2}} - 14276_{5\frac{1}{2}}$	1
8121.454	6	*MB*	12309.681	$20554_{5\frac{1}{2}} - 32864°_{5\frac{1}{2}}$	0	8410.949	10	*MB*	11885.998	$4266°_{3\frac{1}{2}} - 16152_{3\frac{1}{2}}$	19
8127.865	4	*MB*	12299.972	$11340°_{3\frac{1}{2}} - 23640_{4\frac{1}{2}}$	7	8418.233	70	*MB*	11875.714	$6517°_{2\frac{1}{2}} - 18393_{3\frac{1}{2}}$	6
8129.640	70	*MB*	12297.286	$12365°_{4\frac{1}{2}} - 24663_{4\frac{1}{2}}$	37	8426.612	10	*MB*	11863.905	$3995°_{3\frac{1}{2}} - 15859_{4\frac{1}{2}}$	3
8137.067	8	*MB*	12286.062	$13659°_{4\frac{1}{2}} - 25945_{3\frac{1}{2}}$	−4	8428.252	5	*MB*	11861.597	$19483_{2\frac{1}{2}} - 31344°_{3\frac{1}{2}}$	−5
8145.997	10	*MB*	12272.594			8439.489	5	*MB*	11845.803	$13515°_{3\frac{1}{2}} - 25361_{4\frac{1}{2}}$	−17
8148.328	6	*MB*	12269.083	$7713°_{4\frac{1}{2}} - 19982_{4\frac{1}{2}}$	−14	8441.191	10	*MB*	11843.415	$6549°_{2\frac{1}{2}} - 18393_{3\frac{1}{2}}$	−3
8152.624	20	*MB*	12262.618	$4737°_{2\frac{1}{2}} - 17000_{3\frac{1}{2}}$	−15	8459.330	80	*MB*	11818.020	$20554_{5\frac{1}{2}} - 32372°_{4\frac{1}{2}}$	−4
8159.131	4	*MB*	12252.838	$11387°_{3\frac{1}{2}} - 23640_{4\frac{1}{2}}$	6	8464.210	15	*MB*	11811.206	$17232_{7\frac{1}{2}} - 29043°_{6\frac{1}{2}}$	4
8159.583	5	*MB*	12252.160			8472.252	10	*MB*	11799.995	$3793°_{6\frac{1}{2}} - 15593_{6\frac{1}{2}}$	−30
8163.453	5	*MB*	12246.351	$2581°_{4\frac{1}{2}} - 14827_{3\frac{1}{2}}$	−14	8481.119	10	*MB*	11787.658	$12365°_{4\frac{1}{2}} - 24153_{3\frac{1}{2}}$	−1
8164.709	7	*MB*	12244.467	$15134_{4\frac{1}{2}} - 27378°_{5\frac{1}{2}}$	2	8483.685	20	*MB*	11784.093	$3745°_{1\frac{1}{2}} - 15529_{2\frac{1}{2}}$	−7
8165.513	30	*MB*	12243.262	$2382°_{4\frac{1}{2}} - 14625_{5\frac{1}{2}}$	5	8495.345	80	*MB*	11767.919	$7713°_{4\frac{1}{2}} - 19481_{4\frac{1}{2}}$	−31
8175.588	30	*MB*	12228.174	$3593°_{4\frac{1}{2}} - 15822_{3\frac{1}{2}}$	−2	8506.638	10	*MB*	11752.297	$5819°_{4\frac{1}{2}} - 17571_{4\frac{1}{2}}$	9
8179.741	20	*MB*	12221.966	$7259°_{3\frac{1}{2}} - 19481_{4\frac{1}{2}}$	1	8511.340	40	*CC*	11745.804	$2879°_{5\frac{1}{2}} - 14625_{5\frac{1}{2}}$	−3
8199.206	20b	*MB*	12192.951	$2634°_{2\frac{1}{2}} - 14827_{3\frac{1}{2}}$	−5	8511.687	30	*MB*	11745.325	$33148_{2\frac{1}{2}} - 44893°_{3\frac{1}{2}}$	−24
8221.960	30	*MB*	12159.207			8535.134	10	*MB*	11713.059	$2563°_{5\frac{1}{2}} - 14276_{5\frac{1}{2}}$	−5

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
8535.389	10	*MB*	11712.710	$16192°_{4\,1/2}-27905_{4\,1/2}$	19	9075.56	2	*CC*	11015.580	$0°_{3\,1/2}-11015_{3\,1/2}$	1
8539.104	70	*MB*	11707.614	$1410°_{4\,1/2}-13117_{4\,1/2}$	−3	9076.53	2	*V*	11014.403	$5118°_{2\,1/2}-16133_{2\,1/2}$	15
8548.260	8	*CC*	11695.074	$2581°_{4\,1/2}-14276_{5\,1/2}$	33	9118.23	7	*CC*	10964.031	$2563°_{5\,1/2}-13527_{4\,1/2}$	25
8550.126	6	*MB*	11692.522	$4459°_{3\,1/2}-16152_{3\,1/2}$	17	9133.26	6	*CC*	10945.989	$2581°_{4\,1/2}-13527_{4\,1/2}$	7
8552.545	20	*MB*	11689.215	$3745°_{1\,1/2}-15434_{2\,1/2}$	−8	9181.27	6	*CC*	10888.751	$3363°_{2\,1/2}-14252_{3\,1/2}$	0
8555.580	1	*CC*	11685.068			9183.86	1	*CC*	10885.680	$2641°_{3\,1/2}-13527_{4\,1/2}$	0
8556.679	10	*MB*	11683.567	$5616_{4\,1/2}-17300°_{3\,1/2}$	−3	9197.55	2	*CC*	10869.477	$5675°_{4\,1/2}-16545_{5\,1/2}$	−28
				$7454_{1\,1/2}-19138°_{1\,1/2}$	−15	9239.21	2	*CC*	10820.467	$0°_{3\,1/2}-10820_{2\,1/2}$	−18
8575.798	10	*MB*	11657.520	$5513_{5\,1/2}-17171°_{5\,1/2}$	−15	9258.84	25	*CC*	10797.526	$4165_{4\,1/2}-14963°_{5\,1/2}$	−23
8578.902	10	*MB*	11653.302	$1873°_{3\,1/2}-13527_{4\,1/2}$	−2	9312.18	6	*MB*	10735.678	$2382°_{4\,1/2}-13117_{4\,1/2}$	2
8584.840	10	*MB*	11645.242	$7059°_{4\,1/2}-18704_{5\,1/2}$	1	9315.48	3	*MB*	10731.875	$4844°_{1\,1/2}-15576_{1\,1/2}$	−48
8592.914	10	*MB*	11634.300	$4910°_{5\,1/2}-16545_{5\,1/2}$	−5	9320.46	6	*CC*	10726.141	$5819°_{4\,1/2}-16545_{5\,1/2}$	−14
8598.247	20	*MB*	11627.084	$8927°_{5\,1/2}-20554_{5\,1/2}$	2	9322.02	4	*MB*	10724.346	$4511°_{2\,1/2}-15235_{1\,1/2}$	24
8613.485	20	*MB*	11606.514	$5964°_{3\,1/2}-17571_{4\,1/2}$	9	9345.56	2	*CC*	10697.333	$4737°_{2\,1/2}-15434_{2\,1/2}$	7
8616.301	10	*MB*	11602.721	$7878°_{3\,1/2}-19481_{4\,1/2}$	9	9355.18	2	*CC*	10686.333	$3363°_{2\,1/2}-14049_{1\,1/2}$	0
8633.568	10	*MB*	11579.516	$8402°_{3\,1/2}-19982_{4\,1/2}$	−2	9357.63	6	*CC*	10683.535	$3703°_{3\,1/2}-14387_{4\,1/2}$	17
8667.556	10	*MB*	11534.109	$3995°_{3\,1/2}-15529_{2\,1/2}$	−6	9359.10	1	*MB*	10681.857	$16159°_{3\,1/2}-26841_{4\,1/2}$	9
8693.730	4	*CC*	11499.384	$4322°_{2\,1/2}-15822_{3\,1/2}$	33	9360.50	5	*CC*	10680.259	$7713°_{4\,1/2}-18393_{3\,1/2}$	22
8700.767	10	*MB*	11490.084	$14276_{5\,1/2}-25766°_{4\,1/2}$	27	9365.83	4	*MB*	10674.182	$4459°_{3\,1/2}-15134_{4\,1/2}$	4
				$3745°_{1\,1/2}-15235_{1\,1/2}$	−19	9367.20	3	*MB*	10672.620	$2595°_{1\,1/2}-13268_{2\,1/2}$	47
8702.380	70b	*CC*	11487.954	$3793°_{6\,1/2}-15281_{6\,1/2}$	−13	9373.10	1	*CC*	10665.902	$10274°_{3\,1/2}-20940_{3\,1/2}$	34
8716.660	50	*CC*	11469.134	$987°_{4\,1/2}-12456_{3\,1/2}$	0	9386.46	25	*CC*	10650.721		
8720.421	10	*MB*	11464.188	$3363°_{2\,1/2}-14827_{3\,1/2}$	−7	9389.28	2	*CC*	10647.522	$2879°_{5\,1/2}-13527_{4\,1/2}$	−21
8721.310	10	*MB*	11463.019	$2634°_{2\,1/2}-14097_{3\,1/2}$	−8	9398.74	5	*CC*	10636.806	$2581°_{4\,1/2}-13217_{3\,1/2}$	87
8724.528	10	*MB*	11458.791	$6517°_{2\,1/2}-17976_{2\,1/2}$	−2	9422.44	3	*CC*	10610.051	$6389°_{4\,1/2}-17000_{3\,1/2}$	−13
8746.160	2	*CC*	11430.450	$3703°_{3\,1/2}-15134_{4\,1/2}$	−5	9427.05	2	*CC*	10604.863	$17300°_{3\,1/2}-27905_{4\,1/2}$	16
8749.182	20	*MB*	11426.502	$6549°_{2\,1/2}-17976_{2\,1/2}$	−2	9431.30	1	*CC*	10600.084	$10114°_{2\,1/2}-20714_{2\,1/2}$	8
8757.980	2	*CC*	11415.023	$4737°_{2\,1/2}-16152_{3\,1/2}$	19	9446.21	2	*MB*	10583.353	$2634°_{2\,1/2}-13217_{3\,1/2}$	43
8769.900	6	*CC*	11399.508	$4459°_{3\,1/2}-15859_{4\,1/2}$	17	9446.70	4	*MB*	10582.804	$1873°_{3\,1/2}-12456_{3\,1/2}$	−8
8772.143	150	*MB*	11396.593	$2879°_{5\,1/2}-14276_{5\,1/2}$	−9	9452.99	8	*MB*	10575.762	$5616_{4\,1/2}-16192°_{4\,1/2}$	35
8777.180	6	*CC*	11390.053	$19950_{6\,1/2}-31340°_{6\,1/2}$	0	9466.01	2	*V*	10561.216	$4266°_{3\,1/2}-14827_{3\,1/2}$	−9
8777.443	4	*MB*	11389.712	$4203°_{6\,1/2}-15593_{6\,1/2}$	−13	9471.88	4	*CC*	10554.671	$2563°_{5\,1/2}-13117_{4\,1/2}$	−17
8797.210	1	*CC*	11364.120	$3363°_{2\,1/2}-14727_{1\,1/2}$	7	9483.89	2	*CC*	10541.305	$3508°_{0\,1/2}-14049_{1\,1/2}$	14
8798.040	2	*CC*	11363.047	$2140°_{0\,1/2}-13503_{0\,1/2}$	31	9488.10	3	*CC*	10536.627	$2581°_{4\,1/2}-13117_{4\,1/2}$	−37
8812.784	10	*MB*	11344.037	$1873°_{3\,1/2}-13217_{3\,1/2}$	−4	9504.29	2	*CC*	10518.679	$5010°_{2\,1/2}-15529_{2\,1/2}$	−26
8813.240	10	*MB*	11343.450	$4459°_{3\,1/2}-15803_{4\,1/2}$	12	9510.04	3	*MB*	10512.319	$7059°_{4\,1/2}-17571_{4\,1/2}$	−9
8891.200	30	*MB*	11243.988	$1873°_{3\,1/2}-13117_{4\,1/2}$	1	9517.72	2	*CC*	10503.837	$3593°_{4\,1/2}-14097_{3\,1/2}$	25
8899.300	3	*CC*	11233.754	$3593°_{4\,1/2}-14827_{3\,1/2}$	13	9527.12	2	*CC*	10493.473	$17851°_{0\,1/2}-28345_{0\,1/2}$	−42
8910.958	10	*MB*	11219.058	$3508°_{0\,1/2}-14727_{1\,1/2}$	−11	9530.58	1	*MB*	10489.663	$5964°_{3\,1/2}-16454_{2\,1/2}$	4
8941.360	2	*CC*	11180.911	$5819°_{4\,1/2}-17000_{3\,1/2}$	17	9536.53	2	*CC*	10483.119	$28349°_{3\,1/2}-38832_{2\,1/2}$	−7
8970.170	6	*CC*	11145.001	$2382°_{4\,1/2}-13527_{4\,1/2}$	8	9536.92	5	*MB*	10482.690	$3793°_{6\,1/2}-14276_{5\,1/2}$	26
8973.010	1	*CC*	11141.473	$5010°_{2\,1/2}-16152_{3\,1/2}$	−33	9542.41	3	*MB*	10476.659	$5675°_{4\,1/2}-16152_{3\,1/2}$	45
8993.410	1	*CC*	11116.201	$2140°_{0\,1/2}-13256_{1\,1/2}$	−7	9543.11	3	*CC*	10475.891	$17475°_{4\,1/2}-27950_{5\,1/2}$	23
8998.680	4	*CC*	11109.691	$987°_{4\,1/2}-12097_{3\,1/2}$	26	9545.38	3	*CC*	10473.399	$4266°_{3\,1/2}-14739_{2\,1/2}$	35
9022.700	3	*CC*	11080.115	$2595°_{1\,1/2}-13675_{2\,1/2}$	37	9553.10	2	*CC*	10464.936	$15803_{4\,1/2}-26268°_{3\,1/2}$	43
9024.687	10	*MB*	11077.676	$4203°_{6\,1/2}-15281_{6\,1/2}$	8	9559.67	1	*CC*	10457.743	$5118°_{2\,1/2}-15576_{1\,1/2}$	−18
9031.16	3	*CC*	11069.736	$4459°_{3\,1/2}-15529_{2\,1/2}$	32	9592.83	2	*MB*	10421.594	$4203°_{6\,1/2}-14625_{5\,1/2}$	25
9043.42	4	*CC*	11054.729	$8927°_{5\,1/2}-19982_{4\,1/2}$	56	9596.99	3	*MB*	10417.076	$4322°_{2\,1/2}-14739_{2\,1/2}$	23
9050.22	4	*CC*	11046.423	$1410°_{4\,1/2}-12456_{3\,1/2}$	−18	9600.73	1	*CC*	10413.018	$22576_{2\,1/2}-32989°_{3\,1/2}$	−29
9060.73	4	*CC*	11033.610	$5118°_{2\,1/2}-16152_{3\,1/2}$	39	9620.45	3	*MB*	10391.674	$3995°_{3\,1/2}-14387_{4\,1/2}$	22

501-968 O - 73 - 11

TABLE 4. *Spectral lines of* Ce II – Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
9621.11	4	*MB*	10390.961	$4844°_{1\frac{1}{2}} - 15235_{1\frac{1}{2}}$	26	10116.67	2	*MB*	9881.966	$987°_{4\frac{1}{2}} - 10869_{4\frac{1}{2}}$	37
9628.75	1	*CC*	10382.716	$7092_{5\frac{1}{2}} - 17475°_{4\frac{1}{2}}$	−41	10119.44	1	*MB*	9879.262	$5942°_{3\frac{1}{2}} - 15822_{3\frac{1}{2}}$	1
9639.98	1	*CC*	10370.621	$4910°_{5\frac{1}{2}} - 15281_{6\frac{1}{2}}$	−17	10123.25	3	*MB*	9875.543	$2581°_{4\frac{1}{2}} - 12456_{3\frac{1}{2}}$	55
9648.30	1	*CC*	10361.678	$6638°_{4\frac{1}{2}} - 17000_{3\frac{1}{2}}$	−70	10125.84	1	*MB*	9873.017	$39394_{3\frac{1}{2}} - 49267°_{4\frac{1}{2}}$	29
9659.94	5	*CC*	10349.193	$1410°_{4\frac{1}{2}} - 11759_{5\frac{1}{2}}$	30	10131.75	2	*MB*	9867.258		
9670.56	4	*MB*	10337.827	$7233°_{5\frac{1}{2}} - 17571_{4\frac{1}{2}}$	54	10142.15	1	*CC*	9857.140	$5964°_{3\frac{1}{2}} - 15822_{3\frac{1}{2}}$	−22
9691.12	5	*CC*	10315.895	$5118°_{2\frac{1}{2}} - 15434_{2\frac{1}{2}}$	3	10168.80	1	*CC*	9831.307	$4266°_{3\frac{1}{2}} - 14097_{3\frac{1}{2}}$	10
9694.52	6	*CC*	10312.278	$3363°_{2\frac{1}{2}} - 13675_{2\frac{1}{2}}$	−16	10169.87	3	*MB*	9830.273	$7341_{5\frac{1}{2}} - 17171°_{5\frac{1}{2}}$	35
9702.04	9	*CC*	10304.285	$3745°_{1\frac{1}{2}} - 14049_{1\frac{1}{2}}$	0	10174.54	5	*MB*	9825.761	$5455°_{7\frac{1}{2}} - 15281_{6\frac{1}{2}}$	4
9712.15	1	*MB*	10293.558	$5283°_{0\frac{1}{2}} - 15576_{1\frac{1}{2}}$	19	10185.49	5	*MB*	9815.198	$2641°_{3\frac{1}{2}} - 12456_{3\frac{1}{2}}$	11
9722.38	7	*CC*	10282.727	$9198°_{3\frac{1}{2}} - 19481_{4\frac{1}{2}}$	13	10192.25	1	*MB*	9808.688		
9747.02	2	*CC*	10256.733	$3995°_{3\frac{1}{2}} - 14252_{3\frac{1}{2}}$	15	10209.23	1	*MB*	9792.374	$25766°_{4\frac{1}{2}} - 35558_{3\frac{1}{2}}$	27
9774.63	3	*MB*	10227.761	$5283°_{0\frac{1}{2}} - 15510_{0\frac{1}{2}}$	5	10245.56	1	*MB*	9757.651	$9723°_{4\frac{1}{2}} - 19481_{4\frac{1}{2}}$	−53
9779.10	6	*MB*	10223.086	$4910°_{5\frac{1}{2}} - 15134_{4\frac{1}{2}}$	0	10250.08	3	*MB*	9753.348	$4523°_{4\frac{1}{2}} - 14276_{5\frac{1}{2}}$	83
9792.04	2	*CC*	10209.577	$5942°_{3\frac{1}{2}} - 16152_{3\frac{1}{2}}$	−1	10255.48	1	*MB*	9748.213	$3508°_{0\frac{1}{2}} - 13256_{1\frac{1}{2}}$	−17
9809.75	4	*MB*	10191.145			10271.22	4	*MB*	9733.274	$3703°_{3\frac{1}{2}} - 13436_{2\frac{1}{2}}$	14
9831.85	1	*CC*	10168.237	$5964°_{3\frac{1}{2}} - 16133_{2\frac{1}{2}}$	−60	10279.19	1	*MB*	9725.727	$0°_{3\frac{1}{2}} - 9725_{3\frac{1}{2}}$	−5
9841.56	4	*MB*	10158.205	$7818°_{1\frac{1}{2}} - 17976_{2\frac{1}{2}}$	−60	10290.43	1	*MB*	9715.104	$2382°_{4\frac{1}{2}} - 12097_{3\frac{1}{2}}$	74
9847.56	3	*MB*	10152.016	$5651°_{5\frac{1}{2}} - 15803_{4\frac{1}{2}}$	63	10290.99	1	*MB*	9714.576	$4910°_{5\frac{1}{2}} - 14625_{5\frac{1}{2}}$	36
9865.06	10	*MB*	10134.007	$7341_{5\frac{1}{2}} - 17475°_{4\frac{1}{2}}$	−8	10297.10	3	*CC*	9708.811	$5118°_{2\frac{1}{2}} - 14827_{3\frac{1}{2}}$	−5
9874.10	2	*MB*	10124.729	$13515°_{3\frac{1}{2}} - 23640_{4\frac{1}{2}}$	19	10298.86	1	*CC*	9707.152	$11007°_{1\frac{1}{2}} - 20714_{2\frac{1}{2}}$	−7
9889.45	2	*MB*	10109.014	$2595°_{1\frac{1}{2}} - 12704_{1\frac{1}{2}}$	24	10308.75	2	*MB*	9697.839		
9900.68	2	*MB*	10097.548			10315.69	1	*CC*	9691.315	$3745°_{1\frac{1}{2}} - 13436_{2\frac{1}{2}}$	−63
9910.90	1	*CC*	10087.135	$5716°_{3\frac{1}{2}} - 15803_{4\frac{1}{2}}$	41	10323.51	2	*MB*	9683.974		
9924.33	4	*MB*	10073.485	$10641°_{2\frac{1}{2}} - 20714_{2\frac{1}{2}}$	−31	10336.16	1	*CC*	9672.122		
9925.43	8	*MB*	10072.369	$4203°_{6\frac{1}{2}} - 14276_{5\frac{1}{2}}$	5	10338.85	1	*CC*	9669.606		
9927.80	1	*MB*	10069.964	$2634°_{2\frac{1}{2}} - 12704_{1\frac{1}{2}}$	−3	10339.93	1	*MB*	9668.596		
9937.49	1	*MB*	10060.145			10357.32	1	*V*	9652.362	$5924°_{1\frac{1}{2}} - 15576_{1\frac{1}{2}}$	−1
9949.45	1	*MB*	10048.052	$1410°_{4\frac{1}{2}} - 11458_{5\frac{1}{2}}$	3	10376.24	1	*CC*	9634.762	$6517°_{2\frac{1}{2}} - 16152_{3\frac{1}{2}}$	4
9969.35	2	*MB*	10027.995	$987°_{4\frac{1}{2}} - 11015_{3\frac{1}{2}}$	27	10381.66	2	*CC*	9629.730	$10924°_{4\frac{1}{2}} - 20554_{5\frac{1}{2}}$	10
9979.91	5	*MB*	10017.384			10387.16	12	*CC*	9624.633	$5969°_{5\frac{1}{2}} - 15593_{6\frac{1}{2}}$	−19
9994.29	4	*MB*	10002.971	$5819°_{4\frac{1}{2}} - 15822_{3\frac{1}{2}}$	25	10396.87	1	*V*	9615.644	$6517°_{2\frac{1}{2}} - 16133_{2\frac{1}{2}}$	69
10002.24	4	*MB*	9995.020	$3508°_{0\frac{1}{2}} - 13503_{0\frac{1}{2}}$	−17	10404.32	1	*V*	9608.759	$5118°_{2\frac{1}{2}} - 14727_{1\frac{1}{2}}$	25
10011.46	1	*V*	9985.815	$4266°_{3\frac{1}{2}} - 14252_{3\frac{1}{2}}$	35	10407.97	3	*CC*	9605.389	$5924°_{1\frac{1}{2}} - 15529_{2\frac{1}{2}}$	17
10011.63	1	*MB*	9985.646			10452.20	1	*CC*	9564.741	$5964°_{2\frac{1}{2}} - 15529_{2\frac{1}{2}}$	61
10023.86	1	*MB*	9973.462			10496.83	3	*CC*	9524.076	$3593°_{4\frac{1}{2}} - 13117_{4\frac{1}{2}}$	36
10043.84	1	*MB*	9953.623			10498.30	2	*CC*	9522.740	$3745°_{1\frac{1}{2}} - 13268_{2\frac{1}{2}}$	−3
10044.88	3	*MB*	9952.592	$5283°_{0\frac{1}{2}} - 15235_{1\frac{1}{2}}$	42	10505.63	1	*CC*	9516.095	$2581°_{4\frac{1}{2}} - 12097_{3\frac{1}{2}}$	76
10055.24	3	*MB*	9942.338	$5651°_{5\frac{1}{2}} - 15593_{6\frac{1}{2}}$	35	10511.02	3	*CC*	9511.215	$3745°_{1\frac{1}{2}} - 13256_{1\frac{1}{2}}$	−11
10056.67	4	*MB*	9940.924	$7059°_{4\frac{1}{2}} - 17000_{3\frac{1}{2}}$	−10	10532.40	2	*CC*	9491.908	$5942°_{2\frac{1}{2}} - 15434_{2\frac{1}{2}}$	7
10058.87	10	*MB*	9938.750	$7293°_{6\frac{1}{2}} - 17232_{7\frac{1}{2}}$	36	10556.98	2	*CC*	9469.808	$5964°_{3\frac{1}{2}} - 15434_{2\frac{1}{2}}$	5
10064.31	2	*MB*	9933.378	$3593°_{4\frac{1}{2}} - 13527_{4\frac{1}{2}}$	21	10557.41	1	*CC*	9469.425	$6389°_{4\frac{1}{2}} - 15859_{4\frac{1}{2}}$	5
10070.52	2	*CC*	9927.252	$32802_{5\frac{1}{2}} - 42729°_{5\frac{1}{2}}$	−29	10569.82	3	*CC*	9458.307	$5675°_{4\frac{1}{2}} - 15134_{4\frac{1}{2}}$	21
				$4459°_{3\frac{1}{2}} - 14387_{4\frac{1}{2}}$	12	10615.27	3	*CC*	9417.811	$5716°_{3\frac{1}{2}} - 15134_{4\frac{1}{2}}$	−22
10091.04	4	*MB*	9907.065	$6638°_{4\frac{1}{2}} - 16545_{5\frac{1}{2}}$	55	10619.17	4	*CC*	9414.352	$3703°_{3\frac{1}{2}} - 13117_{4\frac{1}{2}}$	24
10098.15	1	*MB*	9900.090	$8804°_{4\frac{1}{2}} - 18704_{5\frac{1}{2}}$	1	10620.24	1	*CC*	9413.401	$6389°_{4\frac{1}{2}} - 15803_{4\frac{1}{2}}$	33
10100.55	1	*MB*	9897.738			10646.46	3	*CC*	9390.217	$5437°_{3\frac{1}{2}} - 14827_{3\frac{1}{2}}$	16
10103.18	1	*V*	9895.161	$4844°_{1\frac{1}{2}} - 14739_{2\frac{1}{2}}$	44	10674.73	2	*CC*	9365.353	$4910°_{5\frac{1}{2}} - 14276_{5\frac{1}{2}}$	18
10105.10	6	*MB*	9893.281	$3363°_{2\frac{1}{2}} - 13256_{1\frac{1}{2}}$	7	10680.48	2	*CC*	9360.307	$4737°_{2\frac{1}{2}} - 14097_{3\frac{1}{2}}$	−9
10116.02	2	*MB*	9882.601			10688.84	1	*CC*	9352.990	$4322°_{2\frac{1}{2}} - 13675_{2\frac{1}{2}}$	−23

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
10696.42	15	CC	9346.362	$5616_{4\,1/2}-14963°_{5\,1/2}$	1	11491.75	2	V	8699.513	$4737°_{2\,1/2}-13436_{2\,1/2}$	28
10732.53	2	V	9314.916	$5819°_{4\,1/2}-15134_{4\,1/2}$	−18	11543.85	1	V	8660.250	$5437°_{3\,1/2}-14097_{3\,1/2}$	−16
10735.26	1	CC	9312.547	$5969°_{5\,1/2}-15281_{6\,1/2}$	−47	11546.73	1	V	8658.090	$4459°_{3\,1/2}-13117_{4\,1/2}$	40
10736.30	2	CC	9311.640	$7233°_{5\,1/2}-16545_{5\,1/2}$	−2	11590.01	5	V	8625.759	$7233°_{5\,1/2}-15859_{4\,1/2}$	23
10748.50	1	CC	9301.072	$14481°_{2\,1/2}-23782_{2\,1/2}$	14	11591.08	2	V	8624.963	$5651°_{5\,1/2}-14276_{5\,1/2}$	22
10757.84	2	V	9293.000	$1410°_{4\,1/2}-10703_{4\,1/2}$	0	11602.76	2	V	8616.280	$4910°_{5\,1/2}-13527_{4\,1/2}$	4
10760.66	1	CC	9290.561	$26268°_{3\,1/2}-35558_{3\,1/2}$	61	11624.32	4	V	8600.299	$7259°_{3\,1/2}-15859_{4\,1/2}$	11
10782.03	2	CC	9272.151	$6549°_{2\,1/2}-15822_{3\,1/2}$	0	11628.39	1	V	8597.289	$8402°_{3\,1/2}-17000_{3\,1/2}$	−49
10783.05	1	CC	9271.270	$18704_{5\,1/2}-27975°_{4\,1/2}$	−36	11631.62	3	V	8594.902	$4523°_{4\,1/2}-13117_{4\,1/2}$	13
10795.20	2	CC	9260.839	$4266°_{3\,1/2}-13527_{4\,1/2}$	−2	11635.32	1	V	8592.169	$4844°_{1\,1/2}-13436_{2\,1/2}$	−44
10803.38	2	CC	9253.824	$7746°_{2\,1/2}-17000_{3\,1/2}$	2	11643.35	4	V	8586.243	$4165_{4\,1/2}-12751°_{5\,1/2}$	11
10806.26	1	CC	9251.356	$7293°_{6\,1/2}-16545_{5\,1/2}$	25	11653.63	1	V	8578.669	$2879°_{5\,1/2}-11458_{5\,1/2}$	11
10826.44	2	CC	9234.117	$3793°_{6\,1/2}-13027_{6\,1/2}$	−6	11658.60	5	V	8575.012	$2879°_{5\,1/2}-11454_{6\,1/2}$	6
10870.21	2	CC	9196.931	$8278_{5\,1/2}-17475°_{4\,1/2}$	−38					$12365°_{4\,1/2}-20940_{3\,1/2}$	−20
10876.90	2	CC	9191.278	$5942°_{3\,1/2}-15134_{4\,1/2}$	26	11665.84	1	V	8569.690	$7233°_{5\,1/2}-15803_{4\,1/2}$	7
10889.46	1	V	9180.677	$7011_{4\,1/2}-16192°_{4\,1/2}$	15	11668.10	4	V	8568.030	$5819°_{4\,1/2}-14387_{4\,1/2}$	31
10903.62	2	CC	9168.750	$8402°_{3\,1/2}-17571_{4\,1/2}$	17	11711.86	3	V	8536.017	$5716°_{3\,1/2}-14252_{3\,1/2}$	55
10908.00	1	CC	9165.073	$6638°_{4\,1/2}-15803_{4\,1/2}$	21	11734.79	3	V	8519.337	$4737°_{2\,1/2}-13256_{1\,1/2}$	9
10908.72	6	CC	9164.468	$4511°_{2\,1/2}-13675_{2\,1/2}$	3	11741.13	1	V	8514.737	$7061°_{0\,1/2}-15576_{1\,1/2}$	7
10958.88	1	CC	9122.517	$3995°_{3\,1/2}-13117_{4\,1/2}$	55	11746.37	3	V	8510.939	$8789_{2\,1/2}-17300°_{3\,1/2}$	9
10972.26	2	CC	9111.392	$5716°_{3\,1/2}-14827_{3\,1/2}$	−15	11757.66	2	V	8502.766	$4201°_{1\,1/2}-12704_{1\,1/2}$	25
10994.04	2	CC	9093.347	$9053_{3\,1/2}-18147°_{2\,1/2}$	−28	11767.26	4	V	8495.829	$6638°_{4\,1/2}-15134_{4\,1/2}$	40
				$3363°_{2\,1/2}-12456_{3\,1/2}$	28	11815.34	4	V	8461.258	$3995°_{3\,1/2}-12456_{3\,1/2}$	−27
11001.92	2	V	9086.834	$5010°_{2\,1/2}-14097_{3\,1/2}$	15	11820.98	5	V	8457.221	$5819°_{4\,1/2}-14276_{5\,1/2}$	36
11014.91	2	V	9076.118	$2382°_{4\,1/2}-11458_{5\,1/2}$	11	11833.00	6	V	8448.630	$0°_{3\,1/2}-8448_{2\,1/2}$	−10
11040.33	1	V	9055.220	$6521°_{1\,1/2}-15576_{1\,1/2}$	−15	11839.08	1	V	8444.291	$5942°_{3\,1/2}-14387_{4\,1/2}$	−22
11040.82	1	V	9054.818	$4201°_{1\,1/2}-13256_{1\,1/2}$	10	11844.80	1	V	8440.213	$1873°_{3\,1/2}-10314_{4\,1/2}$	−14
11042.27	2	V	9053.629	$0°_{3\,1/2}-9053_{3\,1/2}$	0	11848.36	1	V	8437.677	$6389°_{4\,1/2}-14827_{3\,1/2}$	−3
11080.15	3	V	9022.677	$7522°_{5\,1/2}-16545_{5\,1/2}$	31	11864.75	2	V	8426.021	$5010°_{2\,1/2}-13436_{2\,1/2}$	33
11102.95	1	V	9004.149	$4523°_{4\,1/2}-13527_{4\,1/2}$	−56	11868.26	1	V	8423.529	$4844°_{1\,1/2}-13268_{2\,1/2}$	−44
11105.85	3	V	9001.798	$4266°_{3\,1/2}-13268_{2\,1/2}$	−22	11870.49	3	V	8421.947	$5675°_{4\,1/2}-14097_{3\,1/2}$	21
11131.59	3	V	8980.983	$9723°_{4\,1/2}-18704_{5\,1/2}$	5	11871.25	2	V	8421.408	$9053_{3\,1/2}-17475°_{4\,1/2}$	14
11168.12	5	V	8951.607	$4266°_{3\,1/2}-13217_{3\,1/2}$	28	11876.04	1	V	8418.011	$12365°_{4\,1/2}-20783_{5\,1/2}$	27
11170.45	2	V	8949.740	$5675°_{4\,1/2}-14625_{5\,1/2}$	0	11910.41	3	V	8393.719	$3703°_{3\,1/2}-12097_{3\,1/2}$	37
11174.42	2	V	8946.560	$1873°_{3\,1/2}-10820_{2\,1/2}$	8	11927.13	4	V	8381.953	$4322°_{2\,1/2}-12704_{1\,1/2}$	27
11184.68	1	V	8938.353	$4737°_{2\,1/2}-13675_{2\,1/2}$	5	11927.73	5	V	8381.531	$5716°_{3\,1/2}-14097_{3\,1/2}$	58
11241.53	1	V	8893.151	$8278_{5\,1/2}-17171°_{5\,1/2}$	−39	11938.39	1	V	8374.047	$7202°_{2\,1/2}-15576_{1\,1/2}$	8
11252.11	2	V	8884.789	$6549°_{2\,1/2}-15434_{2\,1/2}$	−1					$2641°_{3\,1/2}-11015_{3\,1/2}$	27
11253.44	1	V	8883.739	$12057°_{2\,1/2}-20940_{3\,1/2}$	7	11946.67	4	V	8368.243	$6913°_{6\,1/2}-15281_{6\,1/2}$	33
11258.48	3	V	8879.762	$2879°_{5\,1/2}-11759_{5\,1/2}$	−9	12014.34	3	V	8321.110	$2382°_{4\,1/2}-10703_{4\,1/2}$	51
11294.27	2	V	8851.623	$8448_{2\,1/2}-17300°_{3\,1/2}$	−45	12022.52	1	V	8315.448	$1410°_{4\,1/2}-9725_{3\,1/2}$	19
11329.76	2	V	8823.896	$4203°_{6\,1/2}-13027_{6\,1/2}$	72	12030.37	2	V	8310.022	$6517°_{2\,1/2}-14827_{3\,1/2}$	18
11356.22	2	V	8803.336	$5924°_{1\,1/2}-14727_{1\,1/2}$	1	12031.29	3	V	8309.387	$5942°_{3\,1/2}-14252_{3\,1/2}$	7
11360.15	1	V	8800.291	$7059°_{4\,1/2}-15859_{4\,1/2}$	0	12045.20	1	V	8299.791	$7293°_{6\,1/2}-15593_{6\,1/2}$	69
11393.09	2	V	8774.847	$5964°_{3\,1/2}-14739_{2\,1/2}$	−17	12048.22	3	V	8297.710	$7278°_{1\,1/2}-15576_{1\,1/2}$	64
11401.21	1	V	8768.598	$8531_{3\,1/2}-17300°_{3\,1/2}$	−33	12061.86	2	V	8288.327	$2581°_{4\,1/2}-10869_{4\,1/2}$	43
11403.00	1	V	8767.221	$8804°_{4\,1/2}-17571_{4\,1/2}$	45	12075.97	2	V	8278.643	$5819°_{4\,1/2}-14097_{3\,1/2}$	67
11414.86	3	V	8758.112	$4459°_{3\,1/2}-13217_{3\,1/2}$	9					$8175°_{2\,1/2}-16454_{2\,1/2}$	−48
11431.48	1	V	8745.379	$4511°_{2\,1/2}-13256_{1\,1/2}$	−64	12097.54	5	V	8263.882	$2382°_{4\,1/2}-10646_{5\,1/2}$	58
11480.00	1	V	8708.417	$7746°_{2\,1/2}-16454_{2\,1/2}$	47	12107.14	2	V	8257.329	$5010°_{2\,1/2}-13268_{2\,1/2}$	−18

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
12116.87	4	V	8250.698	$7278°_{1\frac{1}{2}}-15529_{2\frac{1}{2}}$	45	12798.83	6	V	7811.077	$5716°_{3\frac{1}{2}}-13527_{4\frac{1}{2}}$	54
12135.11	2	V	8238.297	$5437°_{3\frac{1}{2}}-13675_{2\frac{1}{2}}$	−2	12812.28	1	V	7802.878	$12751°_{5\frac{1}{2}}-20554_{5\frac{1}{2}}$	64
12139.08	2	V	8235.603	$6389°_{4\frac{1}{2}}-14625_{5\frac{1}{2}}$	42	12844.01	3	V	7783.601	$4165_{4\frac{1}{2}}-11949°_{3\frac{1}{2}}$	−37
12144.51	1	V	8231.921	$7278°_{1\frac{1}{2}}-15510_{0\frac{1}{2}}$	57	12844.28	3	V	7783.438	$7746°_{2\frac{1}{2}}-15529_{2\frac{1}{2}}$	47
12149.94	1	V	8228.242	$12326°_{6\frac{1}{2}}-20554_{5\frac{1}{2}}$	63	12849.08	2	V	7780.530	$5437°_{3\frac{1}{2}}-13217_{3\frac{1}{2}}$	−23
12161.38	1	V	8220.501	$5283°_{0\frac{1}{2}}-13503_{0\frac{1}{2}}$	22	12850.83	3	V	7779.470	$10924°_{4\frac{1}{2}}-18704_{5\frac{1}{2}}$	34
12179.75	5	V	8208.103	$11742°_{5\frac{1}{2}}-19950_{6\frac{1}{2}}$	8	12858.90	1	V	7774.588	$4322°_{2\frac{1}{2}}-12097_{3\frac{1}{2}}$	20
12191.34	3	V	8200.300	$4165_{4\frac{1}{2}}-12365°_{4\frac{1}{2}}$	44	12884.75	6	V	7758.990	$7522°_{5\frac{1}{2}}-15281_{6\frac{1}{2}}$	11
12198.09	1	V	8195.762	$8804°_{4\frac{1}{2}}-17000_{3\frac{1}{2}}$	−20	12900.16	3	V	7749.722	$8402°_{3\frac{1}{2}}-16152_{3\frac{1}{2}}$	13
12201.64	3	V	8193.377	$4511°_{2\frac{1}{2}}-12704_{1\frac{1}{2}}$	1	12901.63	2	V	7748.839	$6638°_{4\frac{1}{2}}-14387_{4\frac{1}{2}}$	−14
12213.01	3	V	8185.750	$2634°_{2\frac{1}{2}}-10820_{2\frac{1}{2}}$	−69	12914.70	1	V	7740.997	$8804°_{4\frac{1}{2}}-16545_{5\frac{1}{2}}$	−47
12223.22	2	V	8178.912	$2641°_{3\frac{1}{2}}-10820_{2\frac{1}{2}}$	−14	12925.45	2	V	7734.559	$6517°_{2\frac{1}{2}}-14252_{3\frac{1}{2}}$	0
12224.37	2	V	8178.143	$12762°_{4\frac{1}{2}}-20940_{3\frac{1}{2}}$	−54	12928.12	1	V	7732.961	$5942°_{3\frac{1}{2}}-13675_{2\frac{1}{2}}$	38
12226.39	6	V	8176.792	$7341_{5\frac{1}{2}}-15517°_{6\frac{1}{2}}$	27					$2581°_{4\frac{1}{2}}-10314_{4\frac{1}{2}}$	57
12228.16	2	V	8175.608	$7259°_{3\frac{1}{2}}-15434_{2\frac{1}{2}}$	−15	12932.24	1	V	7730.498	$8402°_{3\frac{1}{2}}-16133_{2\frac{1}{2}}$	−27
12230.95	3	V	8173.743	$7061°_{0\frac{1}{2}}-15235_{1\frac{1}{2}}$	2	12946.05	2	V	7722.251	$0°_{3\frac{1}{2}}-7722_{2\frac{1}{2}}$	−33
12243.19	2	V	8165.571	$3593°_{4\frac{1}{2}}-11759_{5\frac{1}{2}}$	−13	12950.90	6	V	7719.360	$4737°_{2\frac{1}{2}}-12456_{3\frac{1}{2}}$	−12
12267.52	1	V	8149.377	$5118°_{2\frac{1}{2}}-13268_{2\frac{1}{2}}$	−34	12963.06	2	V	7712.118	$6913°_{6\frac{1}{2}}-14625_{5\frac{1}{2}}$	8
12273.13	1	V	8145.652	$5513_{5\frac{1}{2}}-13659°_{4\frac{1}{2}}$	32	12964.30	2	V	7711.381	$7818°_{1\frac{1}{2}}-15529_{2\frac{1}{2}}$	−47
12281.52	1	V	8140.087	$2563°_{5\frac{1}{2}}-10703_{4\frac{1}{2}}$	15	12969.82	2	V	7708.099	$5819°_{4\frac{1}{2}}-13527_{4\frac{1}{2}}$	−26
12284.81	1	V	8137.907	$5118°_{2\frac{1}{2}}-13256_{1\frac{1}{2}}$	12	12970.46	4	V	7707.718	$6389°_{4\frac{1}{2}}-14097_{3\frac{1}{2}}$	−28
12290.64	6	V	8134.047	$4322°_{2\frac{1}{2}}-12456_{3\frac{1}{2}}$	9	12981.05	3	V	7701.430	$10274°_{3\frac{1}{2}}-17976_{2\frac{1}{2}}$	−11
12294.93	6	V	8131.209	$0°_{3\frac{1}{2}}-8131_{4\frac{1}{2}}$	−7	12995.93	2	V	7692.613	$7818°_{1\frac{1}{2}}-15510_{0\frac{1}{2}}$	−25
12297.39	2	V	8129.582	$12751°_{5\frac{1}{2}}-20881_{6\frac{1}{2}}$	37	13016.48	5	V	7680.468	$5437°_{3\frac{1}{2}}-13117_{4\frac{1}{2}}$	−31
12308.79	2	V	8122.053	$2581°_{4\frac{1}{2}}-10703_{4\frac{1}{2}}$	5	13041.57	3	V	7665.692	$7061°_{0\frac{1}{2}}-14727_{1\frac{1}{2}}$	−9
12316.77	2	V	8116.791	$4910°_{5\frac{1}{2}}-13027_{6\frac{1}{2}}$	−3	13043.29	3	V	7664.681	$3793°_{6\frac{1}{2}}-11458_{5\frac{1}{2}}$	−37
12357.76	6	V	8089.868	$5437°_{3\frac{1}{2}}-13527_{4\frac{1}{2}}$	51	13049.51	3	V	7661.028	$3793°_{6\frac{1}{2}}-11454_{6\frac{1}{2}}$	−38
12368.46	2	V	8082.869	$2563°_{5\frac{1}{2}}-10646_{5\frac{1}{2}}$	32	13079.71	3	V	7643.339	$1410°_{4\frac{1}{2}}-9053_{3\frac{1}{2}}$	14
12379.10	4	V	8075.922	$7746°_{2\frac{1}{2}}-15822_{3\frac{1}{2}}$	48	13088.87	6	V	7637.990	$6638°_{4\frac{1}{2}}-14276_{5\frac{1}{2}}$	−49
12380.64	1	V	8074.917	$7059°_{4\frac{1}{2}}-15134_{4\frac{1}{2}}$	−58	13116.23	3	V	7622.057	$7341_{5\frac{1}{2}}-14963°_{5\frac{1}{2}}$	−35
12386.59	3	V	8071.039	$7522°_{5\frac{1}{2}}-15593_{6\frac{1}{2}}$	1	13123.66	1	V	7617.742	$8927°_{5\frac{1}{2}}-16545_{5\frac{1}{2}}$	−12
12394.28	2	V	8066.031	$987°_{4\frac{1}{2}}-9053_{3\frac{1}{2}}$	13	13125.83	1	V	7616.483	$7818°_{1\frac{1}{2}}-15434_{2\frac{1}{2}}$	−68
12412.58	2	V	8054.139	$7522°_{0\frac{1}{2}}-15576_{1\frac{1}{2}}$	29	13181.32	3	V	7584.419	$5942°_{3\frac{1}{2}}-13527_{4\frac{1}{2}}$	−21
12422.03	5	V	8048.012	$7233°_{5\frac{1}{2}}-15281_{6\frac{1}{2}}$	37	13194.82	3	V	7576.659	$4165_{4\frac{1}{2}}-11742°_{5\frac{1}{2}}$	−35
12501.43	1	V	7996.897	$4459°_{3\frac{1}{2}}-12456_{3\frac{1}{2}}$	23	13212.73	4	V	7566.389	$7059°_{4\frac{1}{2}}-14625_{5\frac{1}{2}}$	−41
12533.27	3	V	7976.581	$8175°_{2\frac{1}{2}}-16152_{3\frac{1}{2}}$	67	13219.82	2	V	7562.331	$5964°_{3\frac{1}{2}}-13527_{4\frac{1}{2}}$	−11
12547.98	1	V	7967.230	$4737°_{2\frac{1}{2}}-12704_{1\frac{1}{2}}$	−30	13238.01	1	V	7551.940	$5716°_{3\frac{1}{2}}-13268_{2\frac{1}{2}}$	−61
12550.20	1	V	7965.821	$3793°_{6\frac{1}{2}}-11759_{5\frac{1}{2}}$	−11	13255.21	4	V	7542.141	$5675°_{4\frac{1}{2}}-13217_{3\frac{1}{2}}$	−71
12573.18	1	V	7951.262	$7011_{4\frac{1}{2}}-14963°_{5\frac{1}{2}}$	−33	13257.13	2	V	7541.048	$8280°_{2\frac{1}{2}}-15822_{3\frac{1}{2}}$	−64
12582.22	4	V	7945.549	$4511°_{2\frac{1}{2}}-12456_{3\frac{1}{2}}$	60	13266.63	1	V	7535.648	$10035°_{5\frac{1}{2}}-17571_{4\frac{1}{2}}$	−41
12603.79	2	V	7931.951	$2382°_{4\frac{1}{2}}-10314_{4\frac{1}{2}}$	35	13269.52	2	V	7534.007	$11949°_{3\frac{1}{2}}-19483_{2\frac{1}{2}}$	−28
12608.85	1	V	7928.768	$13012°_{2\frac{1}{2}}-20940_{3\frac{1}{2}}$	24	13272.86	3	V	7532.111	$6517°_{2\frac{1}{2}}-14049_{1\frac{1}{2}}$	−30
12640.14	5	V	7909.141	$987°_{4\frac{1}{2}}-8896_{5\frac{1}{2}}$	23	13279.47	2	V	7528.362	$6521°_{1\frac{1}{2}}-14049_{1\frac{1}{2}}$	−66
12644.15	3	V	7906.633	$1410°_{4\frac{1}{2}}-9316_{3\frac{1}{2}}$	25	13300.80	6	V	7516.289	$3793°_{6\frac{1}{2}}-11309_{7\frac{1}{2}}$	−48
12654.05	2	V	7900.447	$7233°_{5\frac{1}{2}}-15134_{4\frac{1}{2}}$	26	13338.67	4	V	7494.950	$2563°_{5\frac{1}{2}}-10058_{6\frac{1}{2}}$	−42
12676.64	4	V	7886.368	$6389°_{4\frac{1}{2}}-14276_{5\frac{1}{2}}$	12	13353.94	6	V	7486.379	$1410°_{4\frac{1}{2}}-8896_{5\frac{1}{2}}$	−45
12715.61	1	V	7862.199	$6389°_{4\frac{1}{2}}-14252_{3\frac{1}{2}}$	−36	13402.31	2	V	7459.360	$6638°_{4\frac{1}{2}}-14097_{3\frac{1}{2}}$	−70
12719.18	2	V	7859.992	$4844°_{1\frac{1}{2}}-12704_{1\frac{1}{2}}$	2	13406.52	1	V	7457.018	$3363°_{2\frac{1}{2}}-10820_{2\frac{1}{2}}$	−40
12732.47	4	V	7851.788	$1873°_{3\frac{1}{2}}-9725_{3\frac{1}{2}}$	−10	13431.91	2	V	7442.922	$1873°_{3\frac{1}{2}}-9316_{3\frac{1}{2}}$	−55
12766.60	5	V	7830.797	$5437°_{3\frac{1}{2}}-13268_{2\frac{1}{2}}$	1	13447.22	6	V	7434.448	$2879°_{5\frac{1}{2}}-10314_{4\frac{1}{2}}$	−18

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
13470.54	3	V	7421.578	$5283°_{01/2}-12704_{11/2}$	−26	14812.85	3	V	6749.051	$5616_{41/2}-12365°_{41/2}$	−15
13474.49	3	V	7419.402	$8402°_{31/2}-15822_{31/2}$	11	14831.64	2	V	6740.500	$5716°_{31/2}-12456_{31/2}$	−29
13506.77	4	V	7401.670	$5716°_{31/2}-13117_{41/2}$	−35	14843.05	1	V	6735.319	$6521°_{11/2}-13256_{11/2}$	−49
13508.61	2	V	7400.662	$8175°_{21/2}-15576_{11/2}$	−42	14865.87	1	V	6724.980	$10274°_{31/2}-17000_{31/2}$	−55
				$8402°_{31/2}-15803_{41/2}$	20	14874.98	5	V	6720.861	$1410°_{41/2}-8131_{41/2}$	−51
13524.73	1	V	7391.842	$7233°_{51/2}-14625_{51/2}$	−33	14960.93	1	V	6682.250	$2634°_{21/2}-9316_{31/2}$	4
13553.08	1	V	7376.379	$5651°_{51/2}-13027_{61/2}$	−21	14979.45	1	V	6673.988	$7713°_{41/2}-14387_{41/2}$	−34
13583.48	1	V	7359.871	$4737°_{21/2}-12097_{31/2}$	−31	15039.21	2	V	6647.469	$7011_{41/2}-13659°_{41/2}$	−55
				$8169°_{11/2}-15529_{21/2}$	−6	15205.69	3	V	6574.689	$1873°_{31/2}-8448_{21/2}$	−17
13594.93	2	V	7353.672	$8175°_{21/2}-15529_{21/2}$	−40	15230.66	1	V	6563.910	$8175°_{21/2}-14739_{21/2}$	12
13624.15	3	V	7337.901	$5118°_{21/2}-12456_{31/2}$	−38	15253.46	2	V	6554.098	$4266°_{31/2}-10820_{21/2}$	10
13672.47	2	V	7311.968	$3703°_{31/2}-11015_{31/2}$	−16	15277.65	5	V	6543.721	$4910°_{51/2}-11454_{61/2}$	−16
13697.01	2	V	7298.868	$5819°_{41/2}-13117_{41/2}$	59	15346.27	3	V	6514.461	$2382°_{41/2}-8896_{51/2}$	−21
13712.83	4	V	7290.447	$987°_{41/2}-8278_{51/2}$	4	15357.94	3	V	6509.511	$10035°_{51/2}-16545_{51/2}$	−46
13781.01	4	V	7254.379	$4203°_{61/2}-11458_{51/2}$	−39	15385.72	2	V	6497.758	$4322°_{21/2}-10820_{21/2}$	−19
13808.91	2	V	7239.722	$8278_{51/2}-15517°_{61/2}$	4	15435.22	2	V	6476.920	$14404°_{71/2}-20881_{61/2}$	−6
13812.10	2	V	7238.050	$5513_{51/2}-12751°_{51/2}$	−22	15444.26	3	V	6473.129	$7202°_{21/2}-13675_{21/2}$	−63
13852.00	2	V	7217.201	$7059°_{41/2}-14276_{51/2}$	−24	15460.59	1	V	6466.291	$13515°_{31/2}-19982_{41/2}$	−42
13924.35	2	V	7179.701	$1873°_{31/2}-9053_{31/2}$	6	15477.01	2	V	6459.431	$11015_{31/2}-17475°_{41/2}$	−12
13926.58	3	V	7178.551	$2879°_{51/2}-10058_{61/2}$	20	15507.86	1	V	6446.581	$8280°_{21/2}-14727_{11/2}$	−12
13966.43	1	V	7158.069	$6517°_{21/2}-13675_{21/2}$	−33	15518.60	1	V	6442.120	$4203°_{61/2}-10646_{51/2}$	−15
13975.51	4	V	7153.418	$7233°_{51/2}-14387_{41/2}$	−66	15519.71	2	V	6441.659	$7061°_{01/2}-13503_{01/2}$	−10
13984.32	1	V	7148.912	$5969°_{51/2}-13117_{41/2}$	−2	15531.18	2	V	6436.902	$4266°_{31/2}-10703_{41/2}$	−5
13994.84	4	V	7143.538	$987°_{41/2}-8131_{41/2}$	−67	15591.38	2	V	6412.048	$2641°_{31/2}-9053_{31/2}$	−21
14007.17	2	V	7137.249	$6389°_{41/2}-13527_{41/2}$	−47	15640.75	2	V	6391.809	$2382°_{41/2}-8774_{41/2}$	−8
14011.45	2	V	7135.069	$5616_{41/2}-12751°_{51/2}$	26	15674.81	2	V	6377.920	$12326°_{61/2}-18704_{51/2}$	24
14027.57	2	V	7126.870	$8402°_{31/2}-15529_{21/2}$	−37	15684.82	2	V	6373.850	$7878°_{31/2}-14252_{31/2}$	0
14029.72	1	V	7125.778	$6549°_{21/2}-13675_{21/2}$	−35	15713.32	1	V	6362.289	$3363°_{21/2}-9725_{31/2}$	−16
14074.99	3	V	7102.859	$7522°_{51/2}-14625_{51/2}$	−21	15717.64	2	V	6360.540	$4459°_{31/2}-10820_{21/2}$	−73
14098.41	1	V	7091.060	$2634°_{21/2}-9725_{31/2}$	−6	15777.92	2	V	6336.240	$12057°_{21/2}-18393_{31/2}$	20
14117.52	1	V	7081.461	$7746°_{21/2}-14827_{31/2}$	23	15784.75	7	V	6333.498	$2563°_{51/2}-8896_{51/2}$	2
14176.18	5	V	7052.159	$3593°_{41/2}-10646_{51/2}$	−28	15821.72	2	V	6318.699	$3995°_{31/2}-10314_{41/2}$	−2
14195.30	2	V	7042.660	$7233°_{51/2}-14276_{51/2}$	−10	15822.82	2	V	6318.260	$7341_{51/2}-13659°_{41/2}$	−61
14257.86	7	V	7011.758	$0°_{31/2}-7011_{41/2}$	−45	15829.83	6	V	6315.462	$2581°_{41/2}-8896_{51/2}$	−9
14283.79	3	V	6999.030	$8804°_{41/2}-15803_{41/2}$	−55	15845.59	1	V	6309.180	$4511°_{21/2}-10820_{21/2}$	−48
14296.00	1	V	6993.052	$7259°_{31/2}-14252_{31/2}$	−50	15958.40	6	V	6264.581	$3793°_{61/2}-10058_{61/2}$	−10
14386.11	2	V	6949.250	$7878°_{31/2}-14827_{31/2}$	−44	15977.12	6	V	6257.241	$1873°_{31/2}-8131_{41/2}$	−41
14415.09	2	V	6935.279	$4523°_{41/2}-11458_{51/2}$	−40	16050.77	2	V	6228.529	$5513_{51/2}-11742°_{51/2}$	−6
14416.48	3	V	6934.610	$2382°_{41/2}-9316_{31/2}$	−55	16120.75	1	V	6201.491	$10798°_{21/2}-17000_{31/2}$	39
14422.28	1	V	6931.822	$8927°_{51/2}-15859_{41/2}$	−26	16143.32	3	V	6192.821	$2581°_{41/2}-8774_{41/2}$	14
14462.80	1	V	6912.401	$7713°_{41/2}-14625_{51/2}$	−12	16167.05	2	V	6183.731	$11387°_{31/2}-17571_{41/2}$	61
14469.08	1	V	6909.401	$7818°_{11/2}-14727_{11/2}$	8	16176.08	1	V	6180.279	$4523°_{41/2}-10703_{41/2}$	7
14488.50	2	V	6900.140	$1873°_{31/2}-8774_{41/2}$	10	16257.10	2	V	6149.478	$2382°_{41/2}-8531_{31/2}$	47
14512.08	1	V	6888.928	$6638°_{41/2}-13527_{41/2}$	−52	16261.41	1	V	6147.849	$2641°_{31/2}-8789_{21/2}$	28
14556.94	6	V	6867.698	$1410°_{41/2}-8278_{51/2}$	−51	16302.32	1	V	6132.421	$5964°_{31/2}-12097_{31/2}$	41
14589.40	2	V	6852.418	$3793°_{61/2}-10646_{51/2}$	−17	16320.71	2	V	6125.511	$5616_{41/2}-11742°_{51/2}$	5
14633.11	1	V	6831.950	$8131_{41/2}-14963°_{51/2}$	67	16327.32	4	V	6123.031	$4523°_{41/2}-10646_{51/2}$	−5
14641.62	3	V	6827.979	$6389°_{41/2}-13217_{31/2}$	−54	16350.45	1	V	6114.369	$6913°_{61/2}-13027_{61/2}$	3
14654.65	1	V	6821.908	$9723°_{41/2}-16545_{51/2}$	−25	16376.48	7	V	6104.651	$987°_{41/2}-7092_{51/2}$	−2
14790.45	2	V	6759.272	$4165_{41/2}-10924°_{41/2}$	−53	16432.88	2	V	6083.699	$5675°_{41/2}-11759_{51/2}$	−4

TABLE 4. *Spectral lines of* Ce II — Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
16456.11	1	V	6075.111	$10924°_{4\frac{1}{2}} - 17000_{3\frac{1}{2}}$	−19	18040.83	1	V	5541.469	$9198°_{3\frac{1}{2}} - 14739_{2\frac{1}{2}}$	34
16478.46	1	V	6066.871	$6389°_{4\frac{1}{2}} - 12456_{3\frac{1}{2}}$	67	18159.65	3	V	5505.211	$7522°_{5\frac{1}{2}} - 13027_{6\frac{1}{2}}$	75
16500.30	1	V	6058.841	$7059°_{4\frac{1}{2}} - 13117_{4\frac{1}{2}}$	−8	18160.02	3	V	5505.098	$7522°_{5\frac{1}{2}} - 13027_{6\frac{1}{2}}$	−37
16530.48	1	V	6047.779	$4266°_{3\frac{1}{2}} - 10314_{4\frac{1}{2}}$	14	18211.22	6	V	5489.621	$2641°_{3\frac{1}{2}} - 8131_{4\frac{1}{2}}$	−36
16595.18	7	V	6024.200	$987°_{4\frac{1}{2}} - 7011_{4\frac{1}{2}}$	7	18224.01	2	V	5485.768	$5969°_{5\frac{1}{2}} - 11454_{6\frac{1}{2}}$	74
16614.87	3	V	6017.061	$2879°_{5\frac{1}{2}} - 8896_{5\frac{1}{2}}$	27	18269.50	1	V	5472.109	$8804°_{4\frac{1}{2}} - 14276_{5\frac{1}{2}}$	35
16705.41	1	V	5984.450	$8402°_{3\frac{1}{2}} - 14387_{4\frac{1}{2}}$	6	18424.85	1	V	5425.971	$3363°_{2\frac{1}{2}} - 8789_{2\frac{1}{2}}$	18
16722.51	7	V	5978.330	$3793°_{6\frac{1}{2}} - 9771_{7\frac{1}{2}}$	8	18577.80	3	V	5381.299	$8278_{5\frac{1}{2}} - 13659°_{4\frac{1}{2}}$	24
16729.42	2	V	5975.861	$4844°_{1\frac{1}{2}} - 10820_{2\frac{1}{2}}$	19	18597.91	1	V	5375.480	$15565°_{2\frac{1}{2}} - 20940_{3\frac{1}{2}}$	61
16742.25	2	V	5971.282	$8280°_{2\frac{1}{2}} - 14252_{3\frac{1}{2}}$	50	18686.35	1	V	5350.039	$3703°_{3\frac{1}{2}} - 9053_{3\frac{1}{2}}$	4
16792.26	3	V	5953.498	$3363°_{2\frac{1}{2}} - 9316_{3\frac{1}{2}}$	13	18700.15	2	V	5346.091	$10088°_{1\frac{1}{2}} - 15434_{2\frac{1}{2}}$	32
16829.29	1	V	5940.399	$5819°_{4\frac{1}{2}} - 11759_{5\frac{1}{2}}$	45	18786.85	1	V	5321.419	$3995°_{3\frac{1}{2}} - 9316_{3\frac{1}{2}}$	−32
16832.86	2	V	5939.139	$6517°_{2\frac{1}{2}} - 12456_{3\frac{1}{2}}$	12	18811.42	2	V	5314.469	$2140°_{0\frac{1}{2}} - 7454_{1\frac{1}{2}}$	10
16856.78	2	V	5930.711	$1410°_{4\frac{1}{2}} - 7341_{5\frac{1}{2}}$	8	18833.85	2	V	5308.139	$5616_{4\frac{1}{2}} - 10924°_{4\frac{1}{2}}$	2
16956.54	2	V	5895.819	$2382°_{4\frac{1}{2}} - 8278_{5\frac{1}{2}}$	11	18852.49	3	V	5302.891	$3593°_{4\frac{1}{2}} - 8896_{5\frac{1}{2}}$	44
16989.71	2	V	5884.308	$7233°_{5\frac{1}{2}} - 13117_{4\frac{1}{2}}$	13	18899.22	1	V	5289.779	$7722_{2\frac{1}{2}} - 13012°_{2\frac{1}{2}}$	−30
17058.88	7	V	5860.449	$2563°_{5\frac{1}{2}} - 8423_{6\frac{1}{2}}$	10	18980.24	2	V	5267.199	$8169°_{1\frac{1}{2}} - 13436_{2\frac{1}{2}}$	39
17076.97	4	V	5854.241	$4203°_{6\frac{1}{2}} - 10058_{6\frac{1}{2}}$	−50	19172.06	3	V	5214.500	$4511°_{2\frac{1}{2}} - 9725_{3\frac{1}{2}}$	24
				$4459°_{3\frac{1}{2}} - 10314_{4\frac{1}{2}}$	−48	19343.44	2	V	5168.300	$3363°_{2\frac{1}{2}} - 8531_{3\frac{1}{2}}$	49
17077.47	5	V	5854.069	$5455°_{7\frac{1}{2}} - 11309_{7\frac{1}{2}}$	−57	19355.99	1	V	5164.949	$9316_{3\frac{1}{2}} - 14481°_{2\frac{1}{2}}$	−68
17080.74	3	V	5852.949	$2595°_{1\frac{1}{2}} - 8448_{2\frac{1}{2}}$	−47	19422.25	6	V	5147.329	$4910°_{5\frac{1}{2}} - 10058_{6\frac{1}{2}}$	66
17094.20	1	V	5848.340	$1873°_{3\frac{1}{2}} - 7722_{2\frac{1}{2}}$	−10	19457.89	4	V	5137.901	$1873°_{3\frac{1}{2}} - 7011_{4\frac{1}{2}}$	31
17103.03	2	V	5845.321	$10314_{4\frac{1}{2}} - 16159°_{3\frac{1}{2}}$	−52	19521.15	5	V	5121.251	$6638°_{4\frac{1}{2}} - 11759_{5\frac{1}{2}}$	42
17168.32	2	V	5823.091	$14097_{3\frac{1}{2}} - 19920°_{3\frac{1}{2}}$	−32	19586.36	1	V	5104.200	$5716°_{3\frac{1}{2}} - 10820_{2\frac{1}{2}}$	−69
17175.23	3	V	5820.748	$14963°_{5\frac{1}{2}} - 20783_{5\frac{1}{2}}$	59	19590.51	3	V	5103.119	$3793°_{6\frac{1}{2}} - 8896_{5\frac{1}{2}}$	24
17187.16	3	V	5816.708	$8280°_{2\frac{1}{2}} - 14097_{3\frac{1}{2}}$	−34	19631.94	2	V	5092.350	$8175°_{2\frac{1}{2}} - 13268_{2\frac{1}{2}}$	−4
17194.10	3	V	5814.360	$10454°_{1\frac{1}{2}} - 16268_{1\frac{1}{2}}$	−40	19650.11	2	V	5087.641	$2634°_{2\frac{1}{2}} - 7722_{2\frac{1}{2}}$	22
17215.89	2	V	5807.001	$5651°_{5\frac{1}{2}} - 11458_{5\frac{1}{2}}$	5	19652.51	2	V	5087.020	$8169°_{1\frac{1}{2}} - 13256_{1\frac{1}{2}}$	17
17226.60	4	V	5803.391	$5651°_{5\frac{1}{2}} - 11454_{6\frac{1}{2}}$	47	19657.53	1	V	5085.721	$3703°_{3\frac{1}{2}} - 8789_{2\frac{1}{2}}$	−64
17254.10	1	V	5794.141	$7233°_{5\frac{1}{2}} - 13027_{6\frac{1}{2}}$	10	19676.37	1	V	5080.851	$8175°_{2\frac{1}{2}} - 13256_{1\frac{1}{2}}$	13
17265.25	3	V	5790.399	$5969°_{5\frac{1}{2}} - 11759_{5\frac{1}{2}}$	−60	19724.55	3	V	5068.440	$6389°_{4\frac{1}{2}} - 11458_{5\frac{1}{2}}$	29
17288.45	3	V	5782.629	$5675°_{4\frac{1}{2}} - 11458_{5\frac{1}{2}}$	39	19730.78	1	V	5066.840	$11387°_{3\frac{1}{2}} - 16454_{2\frac{1}{2}}$	16
17399.11	1	V	5745.851	$9771_{7\frac{1}{2}} - 15517°_{6\frac{1}{2}}$	35	19794.42	4	V	5050.550	$4266°_{3\frac{1}{2}} - 9316_{3\frac{1}{2}}$	35
17493.56	2	V	5714.828	$2563°_{5\frac{1}{2}} - 8278_{5\frac{1}{2}}$	8	19820.52	1	V	5043.899	$3745°_{1\frac{1}{2}} - 8789_{2\frac{1}{2}}$	−5
17508.54	7	V	5709.939	$5455°_{7\frac{1}{2}} - 11165_{8\frac{1}{2}}$	−11	19858.79	2	V	5034.179	$8402°_{3\frac{1}{2}} - 13436_{2\frac{1}{2}}$	−10
17548.86	6	V	5696.820	$2581°_{4\frac{1}{2}} - 8278_{5\frac{1}{2}}$	23	19864.35	1	V	5032.770	$4165_{4\frac{1}{2}} - 9198°_{3\frac{1}{2}}$	−5
17594.72	6	V	5681.971	$1410°_{4\frac{1}{2}} - 7092_{5\frac{1}{2}}$	10	20041.24	3	V	4988.349	$4737°_{2\frac{1}{2}} - 9725_{3\frac{1}{2}}$	−10
17664.58	2	V	5659.500	$7092_{5\frac{1}{2}} - 12751°_{5\frac{1}{2}}$	−16	20046.18	5	V	4987.120	$5716°_{3\frac{1}{2}} - 10703_{4\frac{1}{2}}$	31
17675.61	2	V	5655.969	$10798°_{2\frac{1}{2}} - 16454_{2\frac{1}{2}}$	−30	20248.09	3	V	4937.390	$7011_{4\frac{1}{2}} - 11949°_{3\frac{1}{2}}$	5
17697.54	1	V	5648.960	$7878°_{3\frac{1}{2}} - 13527_{4\frac{1}{2}}$	49	20292.15	2	V	4926.669	$5942°_{3\frac{1}{2}} - 10869_{4\frac{1}{2}}$	−73
17716.92	1	V	5642.781	$7061°_{0\frac{1}{2}} - 12704_{1\frac{1}{2}}$	−14	20383.13	2	V	4904.679	$5964°_{3\frac{1}{2}} - 10869_{4\frac{1}{2}}$	34
17766.10	1	V	5627.160	$10641°_{2\frac{1}{2}} - 16268_{1\frac{1}{2}}$	−70	20417.97	1	V	4896.310	$5924°_{1\frac{1}{2}} - 10820_{2\frac{1}{2}}$	28
17799.00	1	V	5616.759	$0°_{3\frac{1}{2}} - 5616_{4\frac{1}{2}}$	20	20499.78	3	V	4876.770	$5437°_{3\frac{1}{2}} - 10314_{4\frac{1}{2}}$	30
17847.42	4	V	5601.521	$1410°_{4\frac{1}{2}} - 7011_{4\frac{1}{2}}$	21	20706.52	2	V	4828.079	$3703°_{3\frac{1}{2}} - 8531_{3\frac{1}{2}}$	−4
17906.92	1	V	5582.909	$8804°_{4\frac{1}{2}} - 14387_{4\frac{1}{2}}$	21	20711.19	1	V	4826.990	$5819°_{4\frac{1}{2}} - 10646_{5\frac{1}{2}}$	33
17917.19	1	V	5579.709	$6517°_{2\frac{1}{2}} - 12097_{3\frac{1}{2}}$	52	20740.75	4	V	4820.111	$6638°_{4\frac{1}{2}} - 11458_{5\frac{1}{2}}$	16
17954.74	6	V	5568.039	$4203°_{6\frac{1}{2}} - 9771_{7\frac{1}{2}}$	17	20742.60	2	V	4819.681	$12751°_{5\frac{1}{2}} - 17571_{4\frac{1}{2}}$	62
18013.26	5	V	5549.950	$2581°_{4\frac{1}{2}} - 8131_{4\frac{1}{2}}$	−9	20814.51	1	V	4803.030	$11742°_{5\frac{1}{2}} - 16545_{5\frac{1}{2}}$	6
18021.70	1	V	5547.351	$6549°_{2\frac{1}{2}} - 12097_{3\frac{1}{2}}$	−16	20854.19	1	V	4793.891	$3995°_{3\frac{1}{2}} - 8789_{2\frac{1}{2}}$	−28
18026.16	2	V	5545.979	$14404°_{7\frac{1}{2}} - 19950_{6\frac{1}{2}}$	39					$4523°_{4\frac{1}{2}} - 9316_{3\frac{1}{2}}$	12

TABLE 4. *Spectral lines of* Ce II—Continued

Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}	Wavelength Å	Intensity	Ref.	Wavenumber cm^{-1}	Classification	O–C 0.001 cm^{-1}
21000.33	1	V	4760.530	$5942°_{3\frac{1}{2}} - 10703_{4\frac{1}{2}}$	23	22073.61	1	V	4529.060	$2563°_{5\frac{1}{2}} - 7092_{5\frac{1}{2}}$	29
21003.69	1	V	4759.769	$2581°_{4\frac{1}{2}} - 7341_{5\frac{1}{2}}$	19	22087.95	1	V	4526.120	$987°_{4\frac{1}{2}} - 5513_{5\frac{1}{2}}$	22
21068.98	1	V	4745.019	$3703°_{3\frac{1}{2}} - 8448_{2\frac{1}{2}}$	−27	22240.43	1	V	4495.089	$5819°_{4\frac{1}{2}} - 10314_{4\frac{1}{2}}$	40
21203.57	2	V	4714.900	$5010°_{2\frac{1}{2}} - 9725_{3\frac{1}{2}}$	37	22293.19	1	V	4484.451	$3793°_{6\frac{1}{2}} - 8278_{5\frac{1}{2}}$	31
21225.31	2	V	4710.071	$2382°_{4\frac{1}{2}} - 7092_{5\frac{1}{2}}$	52						
						22346.56	1	V	4473.741	$8278_{5\frac{1}{2}} - 12751°_{5\frac{1}{2}}$	13
21268.98	3	V	4700.400	$7059°_{4\frac{1}{2}} - 11759_{5\frac{1}{2}}$	5	22356.91	1	V	4471.670	$11387°_{3\frac{1}{2}} - 15859_{4\frac{1}{2}}$	38
21303.52	1	V	4692.779	$4203°_{6\frac{1}{2}} - 8896_{5\frac{1}{2}}$	−15	22404.16	1	V	4462.239	$9053_{3\frac{1}{2}} - 13515°_{3\frac{1}{2}}$	15
21435.94	1	V	4663.789	$9723°_{4\frac{1}{2}} - 14387_{4\frac{1}{2}}$	13	22408.57	1	V	4461.361	$2879°_{5\frac{1}{2}} - 7341_{5\frac{1}{2}}$	49
21440.35	1	V	4662.830	$5651°_{5\frac{1}{2}} - 10314_{4\frac{1}{2}}$	25	22714.41	2	V	4401.290	$7341_{5\frac{1}{2}} - 11742°_{5\frac{1}{2}}$	52
21553.09	2	V	4638.440	$5675°_{4\frac{1}{2}} - 10314_{4\frac{1}{2}}$	41						
						22724.58	2	V	4399.321	$7059°_{4\frac{1}{2}} - 11458_{5\frac{1}{2}}$	40
21592.15	2	V	4630.049	$3793°_{6\frac{1}{2}} - 8423_{6\frac{1}{2}}$	11	22738.54	2	V	4396.620	$6913°_{6\frac{1}{2}} - 11309_{7\frac{1}{2}}$	40
21594.43	2	V	4629.560	$2382°_{4\frac{1}{2}} - 7011_{4\frac{1}{2}}$	2	22846.10	1	V	4375.920	$7011_{4\frac{1}{2}} - 11387°_{3\frac{1}{2}}$	−6
21596.30	2	V	4629.159	$987°_{4\frac{1}{2}} - 5616_{4\frac{1}{2}}$	31	22869.62	2	V	4371.420	$5942°_{3\frac{1}{2}} - 10314_{4\frac{1}{2}}$	56
21700.46	1	V	4606.940	$5118°_{2\frac{1}{2}} - 9725_{3\frac{1}{2}}$	13	23216.64	2	V	4306.080	$5010°_{2\frac{1}{2}} - 9316_{3\frac{1}{2}}$	38
21706.40	1	V	4605.679	$9053_{3\frac{1}{2}} - 13659°_{4\frac{1}{2}}$	−20						
						23541.05	2	V	4246.740	$4201°_{1\frac{1}{2}} - 8448_{2\frac{1}{2}}$	−7
21721.91	1	V	4602.391	$5455°_{7\frac{1}{2}} - 10058_{6\frac{1}{2}}$	10	23663.36	2	V	4224.790	$7233°_{5\frac{1}{2}} - 11458_{5\frac{1}{2}}$	64
21742.70	1	V	4597.990	$5716°_{3\frac{1}{2}} - 10314_{4\frac{1}{2}}$	44	23766.36	1	V	4206.480	$1410°_{4\frac{1}{2}} - 5616_{4\frac{1}{2}}$	45
21781.54	1	V	4589.791	$10035°_{5\frac{1}{2}} - 14625_{5\frac{1}{2}}$	0	23999.65	2	V	4165.591	$0°_{3\frac{1}{2}} - 4165_{4\frac{1}{2}}$	41
21830.20	1	V	4579.560	$4737°_{2\frac{1}{2}} - 9316_{3\frac{1}{2}}$	21	24172.58	1	V	4135.790	$3995°_{3\frac{1}{2}} - 8131_{4\frac{1}{2}}$	33
21996.05	1	V	4545.030	$6913°_{6\frac{1}{2}} - 11458_{5\frac{1}{2}}$	69						
						242°0.41	1	V	4125.919	$4322°_{2\frac{1}{2}} - 8448_{2\frac{1}{2}}$	−13
22033.43	2	V	4537.320	$3593°_{4\frac{1}{2}} - 8131_{4\frac{1}{2}}$	−14						

The origin of the wavelengths is indicated in the third column by the symbols from table 1. The list of Verges et al. is indicated by the symbol V. The wave numbers (in cm^{-1}) appear in column 4 with 3 decimal places. The value of the lower energy level and its J-value appear in column 5 and similar data for the upper energy level in column 6. The odd levels are distinguished from the evens by a superscript degree symbol. The difference between the observed wave number of the line and its value calculated from the two energy levels (O−C) appears in the last column in units of 0.001 cm^{-1}.

The average absolute value of O−C for 100 lines at each of 6 wavelengths is shown below (in cm^{-1}).

Wavelength	Av. O−C
3000	0.037
3500	.021
4000	.019
4500	.019
6000	.017
9000	.022

The general precision of the wavelengths between 2600 and 11 000 Å was determined by measuring the precision of repeating differences between 3 pairs of low odd levels. The average deviation of 156 differences from the means was 0.019 cm^{-1}. Therefore the average deviation for a single wave number is 0.014 cm^{-1}.

Further extension of this analysis will require new observations. To find the missing levels of small J-value will require observation of fainter lines with better precision within the present range of wavelengths. To find missing configurations that lie above 50 000 cm^{-1} will require observations with sliding sparks or ring discharges for excitation and new observations below 2500 Å.

The writer is indebted to Mrs. Zipora Goldschmidt for her cheerful collaboration and encouragement in the search for some of the more obscure energy levels. The help of Mrs. Ruth Peterson in managing the data of this formidable spectrum was indispensable.

5. References

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Sugar, J. [1963], J. Opt. Soc. Am. **53**, 831.
Verges, J., Corliss, C. H., and Martin, W. C. [1972], J. Res. Nat. Bur. Stand. (U.S.), **76A**, No. 3, 285–304 (May–June 1972).

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Publications of the National Bureau of Standards*

Citations with Selected Abstracts

SP260-45. **Standard reference materials: Development of NBS standard reference material No. 1579 powdered lead-based paint,** B. Greifer, E. J. Maienthal, T. C. Rains, and S. D. Rasberry, Nat. Bur. Stand. (U.S.), Spec. Publ. 260-45, 31 pages (Mar. 1973) 50 cents, SD Catalog No. C13.10:260-45.

SP370. **Research and testing facilities of the Engineering Mechanics Section, National Bureau of Standards, Washington, D.C.,** By the Staff of the NBS Engineering Mechanics Section. D. J. Chwirut, Coordinator, Nat. Bur. Stand. (U.S.), Spec. Publ. 370, 23 pages (Jan. 1973) 55 cents, SD Catalog No. C13.10:370.

SP377. **Index to the reports of the National Conference on Weights and Measures. From the First to the Fifty-Sixth 1905 to 1971,** F. C. Bell, Nat. Bur. Stand. (U.S.), Spec. Publ. 377, 46 pages (Feb. 1973) 75 cents, SD Catalog No. C13.10:377.

BSS46. **Building practices for disaster mitigation. Proceedings of a Workshop Sponsored by The National Science Foundation, Research Applied to National Needs Program, and The National Bureau of Standards, held at the National Bureau of Standards, Boulder, Colo., Aug. 28-Sept. 1, 1972,** R. Wright, S. Kramer, and C. Culver, Editors, Nat. Bur. Stand. (U.S.), Bldg. Sci. Ser. 46, 483 pages (Feb. 1973) $5.30, SD Catalog No. C13.29/2:46.

FIPS PUB 23. **Objectives and requirements of the federal information processing standards program,** H. S. White, Jr., Nat. Bur. Stand. (U.S.), Fed. Info. Process. Stand. Publ. (FIPS Pub.) 23, 8 pages (1972) 35 cents, SD Catalog No. C13.52:23.

TN583. **Electrochemical Analysis Section: Summary of activities, July 1970 to June 1971,** R. A. Durst, Editor, Nat. Bur. Stand. (U.S.), Tech. Note 583, 113 pages (Feb. 1973) 75 cents, SD Catalog No. C13.46:583.

TN627. **Computation of spectral data for a Josephson junction circuit,** E. G. Johnson, Jr. and D. G. McDonald. Nat. Bur. Stand. (U.S.), Tech. Note 627, 63 pages (Nov. 1972) 60 cents, SD Catalog No. C13.46:627.

Key words: Differential equation; fast Fourier transform; Josephson junction; nonlinear integral-differential equation; spline theory.

A computer program has been developed to study power flow between different frequency channels in a Josephson junction circuit. This paper discusses the mathematical assumptions used to get such results. They are the trapezoidal approximation from spline theory and the use of a finite range of frequencies to characterize the frequency spectrum. This paper describes the program and provides the FORTRAN listing, flow charts, and discusses how to use the program. A discussion of possible sources of errors is also included.

TN629. **Superconducting quantum interference devices: An operational guide for rf-biased systems,** D. B. Sullivan, Nat. Bur. Stand. (U.S.), Tech. Note 629, 47 pages (Nov. 1972) 50 cents, SD Catalog No. C13.46:629.

Key words: Electrical measurements; quantum interference devices; superconductivity.

The report discusses a number of practical considerations concerning the operation and application of rf-biased Superconducting Quantum Interference Devices (SQUID's). In the course of routine operation of these devices one amasses a set of operational rules, many of which never reach the open literature. This report is aimed at filling that void. Topics of discussion include: the readout circuitry, operational limits of the SQUID, rf-coupling to the SQUID, flux transformers, and shielding.

TN630. **Developments in cryoelectronics,** R. A. Kamper and D. B. Sullivan, Nat. Bur. Stand. (U.S.), Tech. Note 630, 73 pages (Nov. 1972) 70 cents, SD Catalog No. C13.46:630.

Key words: Electronics; Josephson effect; precise measurements; superconductivity.

This is a survey of progress to date in the development of new electronic instruments taking advantage of the unique properties of superconductors.

TN633. **Critical two-phase flow for cryogenic fluids,** R. V. Smith, K. R. Randall, and R. Epp, Nat. Bur. Stand. (U.S.), Tech. Note 633, 80 pages (Jan. 1973) 70 cents, SD Catalog No. C13.46:633.

Key words: Analyses; analytical models; choking flow; critical flow; cryogenic fluids; helium; hydrogen; oxygen; reviews; two-phase flow.

This work presents a state-of-the-art survey intended to be useful to a designer of equipment involving two-phase flow of cryogenic fluids. It is desirable to assess the probability of critical, or choking, flow in such a system and, if possible, estimate the critical flow rate. The literature is surveyed, primarily since Smith (1963), and the predictive results for several analytical models are evaluated and compared with experimental data. These results are discussed; however, no firm conclusions are reached because, often, the spread of experimental data is equivalent to the predictive results from the models. Finally, computer evaluations are presented for oxygen, hydrogen and helium along with some design recommendations.

TN735. **The effects of magnetic fields on magnetic storage media used in computers,** S. B. Geller, Nat. Bur. Stand. (U.S.), Tech. Note 735, 35 pages (July 1972) 40 cents, SD Catalog No. C13.46:735.

Key words: Erasure, magnetic media; erasure, permanent magnet; erasure, shielding against; erasure, signal loss due to; mag-

Publications with prices and SD Catalog numbers may be purchased directly from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (foreign: one-fourth additional). Microfiche copies are available from the National Technical Information Service (NTIS), Springfield, Va. 22151. Reprints from outside journals and the NBS Journal of Research may often be obtained directly from the authors.

net fields, erasure with; magnetic media, computer; magnetic media, information damage; permanent magnet, erasure with; permanent magnets; shielding.

Experiments have been performed with different types of magnets to determine their effects on the information stored on magnetic storage media. The test results that were obtained with recorded computer tapes are discussed and guidelines are suggested to computer installation managers for protecting their recorded tapes, disks, and drums against unwarranted erasure by magnetic fields. The effects of other forms of energy on recorded magnetic media are briefly considered.

TN745. **Neutron dose and fluence distributions in an infinite air medium,** G. L. Simmons and C. M. Eisenhauer, Nat. Bur. Stand. (U.S.), Tech. Note 745, 39 pages (Jan. 1973) 65 cents, SD Catalog No. C13.46:745.

Key words: Benchmark problems; dose distributions; moments method; neutron penetration; shielding; weapons radiation.

The moments method is applied to the problem of calculating the neutron dose and fluence distributions in an infinite medium of air. These calculations are compared with Monte Carlo and Discrete Ordinates (S_n) results. Simple parametric representations for the distributions are given which facilitate the calculation of dose and flux distributions in air with a different density.

TN748. **An adjoint gamma-ray moments computer code, ADJMOM-I,** G. L. Simmons, Nat. Bur. Stand. (U.S.), Tech. Note 748, 23 pages (Feb. 1973) 30 cents, SD Catalog No. C13.46:748.

Key words: Adjoint; buildup factor; dosimetry; gamma-ray transport; moment methods; shielding.

In this paper, we discuss a computer code for generating spatial-angular moments of the adjoint gamma-ray flux in an infinite medium. The equation for the flux moments is given and techniques used for the solution are described. Details of the input data and a sample problem are also supplied.

TN751. **Studies of calibration standards used in the department of defense equipment oil analysis program,** D. W. Golightly and J. L. Weber, Nat. Bur. Stand. (U.S.), Tech. Note 751, 48 pages (Jan. 1973) 75 cents, SD Catalog No. C13.46:751.

TN753. **NBS special foreign currency program in Yugoslavia 1971-72,** H. S. Peiser, S. E. Chappell, E. Horowitz, H. Yakowitz, and D. Bluebond, Nat. Bur. Stand. (U.S.), Tech. Note 753, 72 pages (Jan. 1973) 90 cents, SD Catalog No. C13.46:753.

TN754. **Methods of measurement for semiconductor materials, process control, and devices, Quarterly report, July 1 to September 30, 1972,** W. M. Bullis, Editor, Nat. Bur. Stand. (U.S.), Tech. Note 754, 55 pages (Mar. 1973) 80 cents, SD Catalog No. C13.46:754.

TN755. **Some aspects of the setting and hardening of gypsum plaster,** J. R. Clifton, Nat. Bur. Stand. (U.S.), Tech. Note 755, 33 pages (Jan. 1973) 55 cents, SD Catalog No. C13.46:755.

Key words: Colloidal theory; crystallization theory; gypsum; hydration; induction period; plaster of paris; setting mechanisms.

The mechanisms by which gypsum plaster sets and hardens have been investigated and the results generally are consistent with the crystallization theory. No evidence for the presence of colloidal intermediates has been found. The crystallization theory is modified to include, as an intermediate species, solvated calcium sulfate hemihydrate molecules. Evidence is presented that supports the belief that more than one reaction is responsible for the setting and hardening of gypsum plaster.

The roles of accelerators and retarders have been studied by calorimetric, differential thermal analysis, and scanning electron microscopic techniques. The cation is more effective than the anion in accelerating the setting and hardening of gypsum plasters; the catalytic order follows the sequence M^+ M^{2+} M^{3+}. Small amounts of retarders can severely retard the setting and hardening processes.

Influences of temperature, impurities, and production conditions on the setting rates of gypsum plasters are discussed.

TN757. **The smoke density chamber method for evaluating the potential smoke generation of building materials,** T. G. Lee, Nat. Bur. Stand. (U.S.), Tech. Note 757, 20 pages (Jan. 1973) 45 cents, SD Catalog No. C13.46:757.

Key words: Building materials; fire; fire services; smoke; smoke density chamber; smoke potential; test method; visibility.

The paper reviews the Smoke Density Chamber Test Method and illustrates its use and application to assess smoke generation of building materials in fire situations. It shows how test results may aid the Fire Services and code authorities in evaluating and reducing the potential light-obscuration hazard of smoke in buildings. An example is given for calculating visibility in a simplified fire situation involving material of known smoke generation. The smoke generation of some common interior finish and construction materials are given.

The following Bibliography Series are available by purchase from the National Technical Information Service (NTIS), Springfield, Va. 22151.

COM-73-10281. **Index and cumulative list of papers on radiation chemistry,** Vol. V, Nos. 27-52, July through Dec. 1972, Radiation Chemistry Data Center, Radiation Laboratory, University of Notre Dame, Jan. 1973, $6.00.

This column lists all outside publications by the NBS staff, as soon after issuance as practical. For completeness, earlier references not previously reported may be included from time to time.

Abrams, M. D., **Data structures for computer graphics,** (Proc. Symp. on Data Structures in Programming Languages, University of Florida, Gainesville, Fla., Feb. 25-27, 1971), *J. Ass. Comput. Mach. SIGPLAN Notes* **6,** No. 2, 268-286 (Feb. 1971).

Agy, D. L., Nelson, R. E., **An immittance transcomparator,** *Proc. 3d Annual Precision Measurement Association Metrology Conf., National Bureau of Standards, Gaithersburg, Md., June 17-18, 1970,* **1,** 147-154 (Precision Measurements Association, Burbank, Calif., 1970).

Key words: Capacitance; coaxial; high-Q; immittance; inductance; measurement; radio frequency; resonance.

The immittance transcomparator is an instrument which utilizes resonance techniques to make high-Q immittance measurements over the frequency range from 50 MHz to 250 MHz. The basic component of the instrument is a short section of 50 ohm coaxial transmission line with provisions for introducing probes to induce and sample electromagnetic energy. Uncertainties of the order of 0.1% are realizable for the reactive component of the measured immittance.

Allen, J. H., Bender, P. L., **Narrow line rubidium magnetometer for high accuracy field measurements,** *J. Geomagn. Geoelec.* **24,** No. 1, 105-125 (1972).

Key words: Geomagnetism; magnetometer; optical pumping.

Observations of Zeeman transitions in Rb^{87} vapor can be used to make accurate measurements of the earth's magnetic field provided that the resonance lines are narrow enough so that the separate components of the transitions are resolved. However, the resulting relatively low signal-to-noise ratio makes it difficult to follow rapid changes in the field. Self-oscillating magnetometers have rapid response to magnetic field changes and high sensitivity, but poor long-term stability. The advantages of both approaches can be ob-

tained with a compound magnetometer in which a self-oscillating magnetometer is locked with a long time constant to a narrow and well-resolved Zeeman transition. We designed and built two prototype optically pumped Rb^{87} magnetometers of this kind, and carried out a stability test on them. Half-hour means of the magnetic field difference between the two were obtained for a period of nine and a half days. During this time local magnetic field activity ranged from quiet to disturbed and a sudden commencement occurred. The standard deviation of the individual half-hour difference values was 0.02 γ (= 0.02 nanoteslas, or 0.2 microgauss).

Ausloos, P. J., Lias, S. G., **Photochemistry in the far ultraviolet,** *Annu. Rev. Phys. Chem.* **22,** 85-107 (1971).

Key words: Absorption and emission spectroscopy; far (vacuum) ultraviolet; ion-molecule reactions; matrix isolation; photochemistry; photoionization; reaction kinetics; thermodynamic.

The 1969-70 literature relating to far ultraviolet photochemistry has been reviewed. In the limited space allocated to this chapter, the more relevant and controversial developments are confronted. An attempt is made to relate information from various sources in order to obtain a comprehensive view of the entire field.

Ausloos, P., Rebbert, R. E., Sieck, L. W., Tiernan, T. O., **Experimental evidence for statistical randomization of hydrogen atoms in the ethyl cation,** *J. Amer. Chem. Soc. Communications to the Editor* **94,** No. 25, 8939-8941 (1972).

Key words: Alkyl halides; ethyl cations; 1,2-hydride shift; ion-molecule reactions; ionic structure; photoionization.

It is shown that the hydrogen atoms in the ethyl cations formed in the unimolecular decomposition of $CD_3CH_2I^+$, $CH_3CD_2I^+$, $CD_3CH_2Br^+$, $CD_3CH_2CD_3^+$, $CH_3CD_2CH_3^+$ and $CD_3CH_2CH_2CD_3$ are scrambled statistically at reactant gas pressures ranging from 10^{-5} to 1000 torr. Photon absorption (11.6-11.8 eV), electron impact and ^{60}Co-γ radiation have been used in the production of the ethyl cations. Two experimental approaches, kinetic mass spectrometry and chemical end product analysis, have been applied to this problem. The energy barrier for the 1,2-hydride shift in the ethyl cation is shown to be less than 5 kcal/mole.

Ballard, D. B., Bennett, L. H., Swartzendruber, L. J., **Intergranular embrittlement of copper-palladium alloys in salt water,** *Corrosion* **28,** No. 10, 368-373 (Oct. 1972).

Key words: Alloys; copper; corrosion, embrittlement; palladium; salt water.

Intergranular embrittlement occurs when copper-rich Cu-Pd alloys are exposed to an aqueous 3.5 wt% sodium chloride environment. There is no evidence that the embrittlement reaction requires the presence of external or internal stresses for 2, 5, and 15 at% Pd in Cu. Scanning electron microscope (SEM) fractographic observations are reported for as-rolled, vacuum annealed, and hydrogen annealed alloys of composition 95 Cu-5 Pd.

Barbrow, L. E., **Metrication in the United States, a status report, engineering issues,** *Amer. Soc. Civil Eng.* **98,** PP4, 505-510 (Oct. 1972).

Key words: Foreign trade; harmonization of standards; measurement systems; metric system; U.S. metric study.

For 200 years the advantages to America of having an interna tionally harmonized system of measurements have been reviewed in the Congress. Now the first step in the latest reopening of this subject has been taken in the Congress. No one can predict when the Congress will take final action or what that action will be. However, in view of the increasing use of the metric system not only abroad but in the U.S. also, all sectors of our society should study and determine for themselves whether increasing their metric use would be advantageous and, if so, plan to do so most efficiently. The time may come, sooner or later, when these plans will be welded into a master plan for the Nation. The metric problem has gained top-level consideration; the time to prepare for the future is now.

Barbrow, L. E., **The metric system and small business,** *Manage. Aids,* No. **214,** 9 pages (Small Business Administration, Washington, D.C., July 1972).

Barger, R. L., Hall, J. L., **Wavelength of the 3.39-μm laser-saturated absorption line of methane,** *Appl. Phys. Lett.* **22,** No. 4, 196-199 (Feb. 15, 1973).

Key words: Interferometry; laser; methane; saturated absorption; wavelength; wavelength standards.

The wavelength of the 3.39-μm line of methane has been measured with respect to the Kr^{86} 6057-Å standard by using a frequency-controlled Fabry-Perot interferometer. We have exhaustively studied systematic offsets inherent in the experiment, including effects due to asymmetry of the Kr standard line. Lacking a convention relating the defined Kr wavelength 6057.802 105 Å to observables of the krypton line (e.g., center of gravity or fringe maximum intensity point), we report two methane wavelengths: $\lambda_{max\ I} = 33\ 922.314\ 04$ Å and $\lambda_{cg} = 33\ 922.313\ 76$ Å. Both results have an uncertainty of $\delta\lambda = \pm 1.2 \times 10^{-4}$ Å or $\delta\lambda/\lambda = \pm 3.5 \times 10^{-9}$. Multiplication by the frequency measurement of the preceding letter gives the speed of light, $c_{cg} = 299\ 792\ 456.2(1.1)$ m/sec.

Barnes, I. L., Carpenter, B. S., Garner, E. L., Gramlich, J. W., Kuehner, E. C., Machlan, L. A., Maienthal, E. J., Moody, J. R., Moore, L. J., Murphy, T. J., Paulsen, P. J., Sappenfield, K. M., Shields, W. R., **Isotopic abundance ratios and concentrations of selected elements in Apollo 14 samples,** (Proc. 3d Lunar Science Conference, Houston, Tex., Jan. 1972), Supplement 3, *Geochimica et Cosmochimica Acta* **2,** 1465-1472 (1972).

Key words: Absolute abundance ratios; Apollo 14; isotope dilution analyses; Lunar samples; mass spectrometry; relative abundance ratios.

Absolute or relative isotopic abundance ratios have been determined for U, Pb, Rb, Sr, Ca, and Cu on a representative fraction of the bulk fines 14163,159 and for a breccia 14321,221. No significant variations from terrestrial values were noted for the nonradiogenic isotopes. Concentrations were determined for the above elements as well as for Th, B, Ag, Cd, Fe, Ti, and Ni.

$^{207}Pb/^{206}Pb$ ages of about 4860 m.y. (million years) and 4420 m.y. were calculated for 14163 and 14321, respectively. The Pb-U and Pb-Th ages are very slightly discordant, the soils exhibit a reversed discordancy and the breccia a normal discordancy. Extreme inhomogeneity of Rb and Sr in the fines sample was found.

Bay, Z., Luther, G. G., White, J. A., **Measurement of an optical frequency and the speed of light,** *Phys. Rev. Lett.* **29,** No. 3, 189-192 (July 17, 1972).

Key words: Optical frequency; single-standard time-length measurement system; speed of light.

We report the measurement of the frequency of the 633-nm red laser line. This is the first measurement of an optical frequency in the visible range without reference to the speed of light or to a measured wavelength. Combination of the optical frequency with the known wavelength yields c to an accuracy higher than previously known. This method demonstrates the practicability of a single-standard time-length measurement system unified via a defined value of the speed of light.

Bensema, W. D., **Coal mine magnetic-field noise measurements,** *Proc. First West Virginia Conf. on Coal Mine Electrotechnology, West Virginia University, Morgantown, W. Va., Aug. 2-4, 1972,* pp. XII-1 – XII-12 (Aug. 1972).

Key words: Communication; field strength; measurement; mines; noise.

A semiportable measurement system was developed to measure the extremely low frequency magnetic noise spectrum in the frequency range from 40 Hz to 10 kHz. Ambient noise spectra from 40 to 3000 Hz are shown in an underground coal mine location. Magnetic field strengths vary from a high of − 20 dB relative to 1.0 ampere/meter measured at 60 Hz near an AC power bus, to a low of approximately − 138 dB measured at a quiet location underground at 500 Hz. Impulsive noise from nearby electric locomotives raise the background levels by approximately 34 dB. At locations remote from arcing locomotives, deep minima of 60 or more dB were found between harmonics of the 60 Hz powerline frequency. "Three dimensional" graphs are given showing some typical spectra as a function of time.

Bertozzi, W., Cooper, T., Ensslin, N., Heisenberg, J., Kowalski, S., Mills, M., Turchinetz, W., Williamson, C., Fivozinsky, S. P., Lightbody, J. W., Jr., Penner, S., **Deformation parameters of ^{152}Sm by electron scattering,** *Phys. Rev. Lett.* **28,** No. 26, 1711-1713 (June 26, 1972).

Key words: Charge distribution; deformation parameters; electron scattering; high-energy electrons; rotational band; samarium-152.

We have measured the cross sections for excitation of the ground-state rotational band in ^{152}Sm by high-energy electrons. The ground-state charge distribution has been determined including the deformation parameters β_2 and β_4 of the nuclear surface.

Bolz, L. H., Reneker, D. H., Yee, K. W., **Ultrasensitive logarithmic picoammeter for exposure and dose measurement in electron microscopy of polymer crystals,** *J. Phys. E* **5,** No. 11, 1039-1041 (Nov. 1972).

Key words: Electron collection efficiency; electron microscope exposure meters; logarithmic picoammeter; polymer crystals; polymer electron microscopy; radiation damage to polymers.

Measurements of electron beam currents for determination of photographic exposure times and for determination of the radiation dose to which the sample was subjected were facilitated by a logarithmic picoammeter which indicated currents as low as would produce a useful image in a few seconds on a fast emulsion. Since the meter was logarithmic it also indicated the much higher currents ordinarily used without a scale change. Calibration of the electron collection efficiency of the focusing screen used to collect the current enabled the actual current density at the sample to be determined.

Boyle, D. R., Clague, F. R., Reeve, G. R., Wait, D. F., Kanda, M., **An automated precision noise figure measurement system at 60 GHz,** *IEEE Trans. Instrum. Meas.* **IM-21,** No. 4, 543-549 (Nov. 1972).

Key words: Analysis; automation; noise figure; *Y*-factor.

As part of a millimeter-wave development program at the National Bureau of Standards, a precision measurement method and system was devised to automatically measure the effective input noise temperature of 55-65-GHz receivers.

Salient features of the system include a bolometric *Y*-factor measurement, a working "hot" noise source consisting of a waveguide argon gas tube mount developed at the National Bureau of Standards, and a minicomputer system controller operating in Basic. System design considerations and measurement uncertainties are discussed.

Branscomb, L. M., **Product performance in an affluent society,** (Proc. 7th Annual Meeting, Symposium and Workshops Arranged by the National Academy of Engineering, Washington, D.C., April 29-30, 1972), Paper in *Product Quality, Performance, and Cost,* pp. 23-31 (1972).

Key words: Conservation; consumer satisfaction; economic design; product safety; standards; test methods.

A detailed discussion is presented of the ecologic, economic, sociological, and political (international as well as local) reasons why more attention must be paid to the way consumer products are designed, built, and promoted, used, repaired, discarded, etc. The paper follows the theme of the public statements of the current administration as regards concern for the consumer. It touches upon the role of standards and test methods—both existing and those still to be developed in protecting the consumer pocketbook, his health and well-being and what is more important the limited natural resources of the earth.

Brower, W. S., Parker, H. S., Roth, R. S., Waring, J. L., **Phase equilibrium and crystal growth in the system lithium oxide-molybdenum oxide,** *J. Crystal Growth* **16,** 115-120 (1972).

Key words: Alkali molybdates; crystal growth; phase equilibria.

The phase equilibrium relationships of the Li_2MoO_4—MoO_3 system were determined in air. Two intermediate compounds were found to occur in the system and single crystals of these compounds were grown by the Czochralski technique. The first compound $Li_4Mo_5O_{17}$ was found to melt congruently at 544 °C. The x-ray pattern of $Li_4Mo_5O_{17}$ was indexed on the basis of a triclinic cell $a = 6.786$ Å, $b = 9.481$ Å, $c = 10.812$ Å, $\alpha = 107° 1'$, $\beta = 88° 48'$, $\gamma = 110° 12'$. The second intermediate compound $Li_6Mo_4O_{13}$ was found to melt incongruently at 568 °C, and to occur in two polymorphic forms. The x-ray pattern of the first form was indexed on the basis of a triclinic cell $a = 8.227$ Å, $b = 8.503$ Å, $c = 11.46$ Å, $\alpha = 95° 24'$, $\beta = 109° 17'$, $\gamma = 96° 31'$ and the second form was indexed on a similar triclinic cell $a = 8.192$ Å, $b = 8.597$ Å, $c = 11.580$ Å, $\alpha = 111° 17'$, $\beta = 93° 55'$ and $\gamma = 96° 5'$.

Brown, D. W., Wall, L. A., **High-temperature aging of fluoropolymers,** *J. Polym. Sci.,* Part A-1, **10,** 2967-2982 (1972).

Key words: Degradation; fluoro-elastomer; fluoropolymer; tetrafluoroethylene.

Fluoropolymers including those of 3,3,3-trifluoropropene, 2,3,3,3-tetrafluoropropene, 3,3,4,4,5,5,5-heptafluoropentene-1, and their copolymers with tetrafluoroethylene, were aged in air and in its absence at 225 and 305 °C. Intrinsic viscosities were measured before and after aging. Polymers of high tetrafluoroethylene content are most stable. In air the presence of tertiary hydrogens is associated with lowered stability but the presence of tetrafluoroethylene greatly mitigates this effect. Stress-relaxation studies in air of a vulcanizate of 3,3,3-trifluoropropene and tetrafluoroethylene cured by γ-rays indicate that the vulcanizate degrades much more rapidly than the untreated polymer.

Casella, R. C., Trevino, S. F., **Group-theoretical selection rules in inelastic neutron scattering within the rigid-molecule model,** *Phys. Rev. B* **6,** No. 12, 4533-4539 (Dec. 15, 1972).

Key words: Group theory; inelastic; neutron; rigid-molecule; scattering; selection-rules.

The model-independent technique of Elliott and Thorpe (ET) is extended to apply to a class of models in which molecular units undergo translational vibrations with respect to each other and also librations, but in which the internal vibronics of the molecules are neglected. Within the model we find that the ET "structure function" $F^{(r)}(\mathbf{k})$, associated with irreducible representation r and momentum transfer $\mathbf{k}$, can be written in the form $F^{(r)}(\mathbf{k}) = F^{(r)}(\mathbf{k}|R) + F^{(r)}(\mathbf{k}|\theta)$, where R and θ signify translational and rotational oscillations. Moreover, the translational part is identical to that of ET except that the atomic scattering lengths a_n which appear in their result are to be replaced by $\mathbf{k}$-dependent molecular form factors $a_n(\mathbf{k}')$. $F^{(r)}(\mathbf{k}|\theta)$ contains a vector form factor equal to $i\nabla_{\mathbf{k}'}a_n(\mathbf{k}')$, where $\mathbf{k}'$ is related to $\mathbf{k}$ via a rotation. Mathematically, their result is contained in ours as a special case. Physically, we indicate how to use both procedures in concert, thereby aiding in the identification of r as well as in separating the internal from external vibrations and among the latter, the translational and rotational parts thereof. At the Brillouin-zone boundary we employ the so-called multiplier representations, thereby achieving a

simplification both of our results and theirs. By significantly reducing the number of phonon modes to be considered in complex molecular crystals, we have likewise increased the diagnostic power of this method which requires no detailed knowledge of force constants. It is hoped that our results will receive wide application in the identification of phonons in such crystals.

Caswell, R. S., Coyne, J. J., **Interaction of neutrons and secondary charged particles with tissue: Secondary particle spectra,** *Radiat. Res.* **52,** No. 3, 448-470 (Dec. 1972).

Key words: Energy deposition; microdosimetry: neutron interaction with tissue; secondary particle spectra.

Theoretical calculations have been made of the secondary particle spectra for p, d, α, ^{9}Be, ^{11}B, $^{12, 13, 14}C$, $^{14, 16}N$, and ^{16}O produced by interactions of 1- and 14-MeV neutrons with a four-element tissue containing the elements H, C, N, O. Detailed neutron cross-section data have been used in the calculation. Both "initial" spectra of the secondary particles as produced by nuclear reactions and the "equilibrium" spectra produced by particles slowing down are determined. This work is the first step in development of a quantitative description of the "physical" stage in the action of neutron radiation on biological materials. The spectra are input information for energy deposition studies for neutron microdosimetry and for models of the biological action of neutron radiation.

Chappell, S. E., Humphreys, J. C., **The dose-rate response of a dye-polychlorostyrene film dosimeter,** (Proc. Annual Conf. on Nuclear and Space Radiation Effects, Seattle, Wash., July 24-27, 1972), *IEEE Trans. Nuclear Science* **NS-19,** No. 6, 175-180 (1972).

Key words: Absorbed dose; ^{60}Co gamma-ray source; dye-polychlorostyrene film dosimeter; high-intensity pulsed electron source; thin aluminum calorimeters.

The responses of dye-polychlorostyrene film dosimeters are compared at low ($\sim 10^{5}$ rad/sec) dose rates. Low dose rate exposures were obtained with a ^{60}Co gamma-ray pool source, and high dose rates were obtained with a high-intensity, pulsed electron source. The dosimeter is a solid solution of polychlorostyrene and malachite green methoxide which changes color upon irradiation. Two broad absorption peaks appear in the visible region with maxima at about 425 and 625 nm. The change in optical density of the 625-nm peak was monitored and correlated to the absorbed dose received by the dosimeters. At low dose rates, the source output was determined on the basis of a previous calibration with a carbon calorimeter and a cavity ionization chamber; at high dose rates, a thin dosimeter calibration system was employed. The calibration system has as its primary measuring elements aluminum calorimeters whose temperatures after exposure were monitored by chromel-constantan thermocouples. Associated electronics recorded the outputs of the thermocouples at every 0.1 sec. In the two cases, the dosimeters were exposed in a different but homogeneous medium, carbon or polystyrene at the low dose rates and aluminum at the high dose rates. In addition, Monte Carlo calculated stopping power ratios of the dye-film dosimeter to the medium were required to interpret the dose received by the dosimeters. The results indicate the there is no significant difference in the response at the two different rates.

Chesler, S. N., Cram, S. P., **Digitization errors in the measurement of statistical moments of chromatographic peaks,** *Anal. Chem.* **44,** No. 13, 2240-2243 (Nov. 1972).

Key words: Chromatography; statistical moments.

Minimum error curves are calculated for measuring statistical moments of Gaussian and asymmetrical chromatographic peaks which include the effects introduced by analog-to-digital converters and the effect of locating the limits of integration.

Choi, C. S., Mapes, J. E., Prince, E., **The structure of ammonium nitrate (IV),** *Acta Crystallogr.* **B 28,** Part 5, 1357-1361 (May 1972).

Key words: Ammonium nitrate; crystal structure.

The structure of ammonium nitrate (IV), the phase which is stable between -18 and 32.3 °C, has been refined by least-squares methods with three-dimensional neutron diffraction data. 188 independent reflections were observed on a four-circle diffractometer with a neutron wavelength of 1.232 Å and a limiting 2θ angle of 100°. The refinement, using anisotropic temperature factors and an isotropic secondary extinction parameter, gave a final weighted R index of 0.028. The structure is orthorhombic, space group $Pmmn$, with two NH_4NO_3 formula units per unit cell. A two-dimensional network of hydrogen bonds between the nitrogen atoms of the ammonium group and the oxygen atoms at one corner of the nitrate groups forms infinite sheets parallel to the (001) planes of the crystal. Adjacent sheets are bound together by van der Waals forces. This structure is simply related to the structures of the higher temperature phases.

Choi, C. S., Prince, E., **The crystal structure of cyclotrimethylene-trinitramine,** *Acta Crystallogr.* **B 28,** Part 9, 2857-2862 (Sept. 1972).

Key words: Crystal; crystal structure; cyclotrimethylene-trinitramine: explosives; neutron diffraction; organic compound; RDX.

The structure of cyclotrimethylene-trinitramine (RDX), $C_3H_6N_6O_6$, has been refined from single-crystal neutron-diffraction data. The final weighted R index for 836 independent reflections is 0.021. The compound crystallizes in the orthorhombic space group $Pbca$, $a=13.182$ (2), $b=11.574$ (2), $c=10.709$ (2) Å, $Z=8$. The molecule consists of alternate CH_2 and $N\text{-}NO_2$ groups in a puckered ring. The environment of the carbon atoms is essentially tetrahedral, and the $N\text{-}NO_2$ groups are planar. The molecule possesses a plane of approximate mirror symmetry perpendicular to the plane defined by the three carbon atoms. The thermal motion may be described by rigid-body motion of the ring and separate rigid-body motion of the nitro groups.

Clark, A. F., Tryon, P. V., **Material variability as measured by low temperature electrical resistivity,** *Cryogenics* **12,** No. 6, 451-461 (Dec. 1972).

Key words: Aluminum alloys; cryogenic; electrical resistivity; low temperature; material variability; nickel alloy; stainless steels; statistics.

Low temperature electrical resistivity was used to determine the material variability (a) between different manufacturers, (b) between different heats from the same manufacturer, and (c) within a given heat for Al 2024, Al-5 percent Mg alloys, Inconel 718, A286 stainless, and AlSl 316. Generally, the coefficient of variation for solution annealed alloys ranged from 1.2 to 14 percent between manufacturers, 0.8 to 5.1 percent between heats, and 0.1 to 1.6 percent within a heat with stainless steels at the low ends and Al 2024 at the high ends. The variability is increased if the material is in a precipitation-hardened condition. A statistical analysis suggests that the variability within a heat is non-normal. It is also shown that precipitation increases the intrinsic resistivity.

Cook, R. K., **Generation and propagation of sound waves between the ionosphere and the lower atmosphere,** Conf. Proc. No. 115 on *Effects on Atmospheric Acoustic Gravity Waves on Electromagnetic Wave Propagation,* Weisbaden, Germany, Apr. 17-21, 1972, pp. 3-1–3-6 (AGARD of NATO, Neuilly Sur Seine, France, Nov. 1972).

Key words: Auroral; infrasound; ionosphere; microphones; sound waves.

Various physical processes generate sound waves at infrasonic frequencies (oscillation periods > 1.0 sec) in the lower atmosphere. Some typical sources are volcanic explosions, earthquakes, severe storms, and the shock waves from vehicles moving at supersonic

speeds. In the ionosphere, sources of infrasound include auroral discharges and shock waves from satellites and meteorites moving at supersonic speeds. We present the results of an analysis for the generation of sound and propagation downwards due to the heating effects of auroral discharges, particularly those traveling at supersonic speeds in directions parallel to the earth's surface. The "shock" waves from such discharges are propagated steeply downward with very little loss of energy from absorption by viscosity and heat conduction, and are frequently observed at infrasonic stations located at high latitudes. An estimate of auroral heating is derived from the observed strengths of infrasound at the earth's surface.

Coxon, B., **Proton magnetic resonance spectroscopy: Part I,** Chapter in *Advances in Carbohydrate Chemistry and Biochemistry,* **27,** 7-83 (Academic Press, New York, N.Y., 1972).

Key words: Carbohydrates; Fourier transforms; instrumentation; iterative analysis of spectra; non-equivalence; proton magnetic resonance spectroscopy; superconducting solenoids.

Recent applications of proton magnetic resonance spectroscopy to the analysis of carbohydrates are discussed with particular emphasis on the use of superconducting solenoids.

Improvements in magnets, probes, signal-averaging systems and spectrometer consoles are described and also the advantages of using a variety of field frequency stabilization techniques and automatic control and data acquisition.

Detailed discussions of pulse-Fourier transform techniques and of computerized literature analysis of spectra are given.

Crannell, H., Hallowell, P. L., O'Brien, J. T., Finn, J. M., Kline, F. J., Penner, S., Lightbody, J. W., Jr., Fivozinsky, S. P., **Electron scattering from low lying 2^+ states in ^{14}C,** (Proc. Int. Conf. on Nuclear Structure Studies Using Electron Scattering and Photoreaction, Sendai, Japan, Sept. 12-15, 1972), Paper in *Nuclear Structure Studies Using Electron Scattering and Photoreaction,* K. Shoda and H. Ui, Eds., **5,** 375-384 (Laboratory Report of Nuclear Science, Tohoku University, Tomizawa, Sendai, Japan, 1972).

Key words: Electron scattering; ^{14}C; E2 excitations; transition radii.

The excitation of levels below 12 MeV in ^{14}C has been investigated at the National Bureau of Standards electron scattering facility. The target consists of 50 mg/cm² powdered material enriched to 70 percent in ^{14}C contained between 0.025 mm Be foils. Spectra have been obtained for electron energies from 60 to 120 MeV at scattering angles of 92.5, 127.5, and 145 degrees. Levels in ^{14}C at 6.09 (1^-), 6.59 (0^+), 6.73 (3^-), 7.01 (2^+), 8.32 (2^+), 10.43 and 11.35 MeV have been observed.

Czyz, W., Maximon, L. C., **Comments on high energy coherent diffractive production of multi-body states on nuclear targets,** *Acta Phys. Pol. Letters to Editor* **B3,** No. 6, 897-902 (1972).

Key words: Coherent production; diffractive production; Glauber model; hadron scattering; high energy scattering; multibody states.

Arguments are given that the traditional, Glauber-like model for the multiple scattering of composite objects be modified to the extent of including relativistic deformation of the wave functions. It is argued that this modified formalism is a specific realization of Van Hove's model of coherent nuclear production of multi-body states and thus is sufficient to explain the astonishingly small nucleon total cross-sections that have been extracted from multi-boson production experiments. It is shown on the simple example of Lorentz-contracted oscillator wave functions that, to have Van Hove's effect present, the interaction between the components of the diffractively produced object must be of the order of magnitude of their masses.

Dick, C. E., Whittaker, J. K., Sparrow, J. H., **Kiloampere current and charge measurements of a 2 MeV pulsed electron source,** *Nucl. Instrum. Methods* **104,** 131-136 (1972).

Key words: Charge monitor; high frequency; integrator; low current monitor; 2 MeV electron accelerator.

A current monitor has been developed to measure the electron current pulse from the NBS 2 MeV pulsed electron generator. This monitor features low inductance and a risetime of the order of a hundred picoseconds, enabling it to faithfully reproduce high frequency components present in the electron beam pulse. In addition, a charge integrating system comprised of an integrating capacitor and a precision integrator has been developed to measure the total charge contained in the electron beam pulse.

Edwards, J. C., Meijer, P. H. E., **Transition temperatures of systems with mixed ferro and antiferromagnetic coupling,** *Physica* **61,** 67-79 (1972).

Key words: Antiferromagnetism; Bethe constant-coupling; critical temperature; ferromagnetism; Heisenberg model; Ising model; next nearest neighbor interaction.

To study the influence of a mixture of ferromagnetic and antiferromagnetic couplings on the transition temperature of a spin-1/2 system we used the Bethe or constant-coupling method and applied it to two models: Model A, a system containing two types of atoms with different inter- and intra-spin coupling; Model B, a system which contains two antiferromagnetic sublattices that are ferromagnetically coupled. We find that for reasonable values of the parameters the Curie temperature has the tendency to increase when the antiferromagnetic coupling is present, at least for the models considered using Ising and anisotropic Heisenberg coupling. We also were able to develop an expression, based on Model B, for the critical temperature of a spin-1 system.

Eicke, W. G., Jr., Taylor, B. N., **Summary of international comparisons of as-maintained units of voltage and values of $2e/h$,** *IEEE Trans. Instrum. Meas.* **IM-21,** No. 4, 316-319 (Nov. 1972).

Key words: As-maintained; international comparisons; Josephson effect; $2e/h$ measurements.

Using temperature-regulated transportable standard-cell enclosures, the National Bureau of Standards (NBS), under the auspices of the Bureau International des Poids at Mesures (BIPM), during the period June 1971 through June 1972 has carried out a series of direct comparisons of the units of voltage as-maintained by NBS and BIPM, Sèvres, France; the National Physical Laboratory, United Kingdom; the National Research Council, Canada; the National Standards Laboratory, Australia; and the Physikalisch-Technische Bundesanstalt, Germany. The main purpose of these comparisons was to provide a sound basis for intercomparing values of $2e/h$ obtained at the various national laboratories via the ac Josephson effect in superconductors. It was found that when converted to a common unit of voltage, most measured values of $2e/h$ agreed with each other to within the 1 to 2 parts in 10^7 estimated uncertainty (1 standard deviation) of the volt comparisons. This satisfying result would seem to indicate that serious consideration should be given to adopting a single international value of $2e/h$ for use in maintaining units of voltage.

Eisen, H., Rosenstein, M., Silverman, J., **Electron depth-dose distribution measurements in two-layer slab absorbers,** *Radiation Res.* **52,** No. 12, 429-447 (Dec. 1972).

Key words: Depth-dose; dose distribution; dosimetry; dye film; electron beams; film dosimeter; interfaces; Monte Carlo; radiochromic dyes; two-layer slabs.

Electron depth-dose distribution measurements were made using the Chalkley-McLaughlin dye film dosimeter in two-layer slab absorbers of polystyrene-copper, polystyrene-tin, and aluminum-gold. A plane-parallel 2.0-MeV electron beam was used. Data were obtained for 12 cases by varying the location of the interface and by reversing

the order of the slab components. Reproducibility of the measurements was ± 6 percent (2 σ). An investigation of stopping-power ratio evaluation methods based on the treatment of the film dosimeter as a nonperturbing cavity demonstrated that a constant value could be used for each material in a two-layer absorber independent of the thickness of each layer. The error in absorbed dose determination introduced by the use of a constant value ranged up to 8 percent. A film placed at the interface between the two components of the slab was used to estimate the dose at the interface surfaces. Corresponding theoretical calculations were made using a multilayer electron transport computer code developed by Berger. Agreement between the measured and the calculated doses was within 10 percent for metal layers and within 15 percent for polystyrene. The discrepancies for polystyrene can be attributed to the omission of energy loss straggling in the calculation.

Eisenhart, C., Rosenblatt, J. R., **W. J. Youden, 1900-1971,** *Ann. Math. Statist.* **43,** No. 4, 1035-1040 (1972).

Ekberg, J. O., Hansen, J. E., Reader, J., **Analysis of the spectrum of five-times-ionized zirconium (Zr VI),** *J. Opt. Soc. Amer.* **62,** No. 10, 1134-1139 (Oct. 1972).

Key words: Spectra; ultraviolet; wavelengths; zirconium.

The spectrum of Zr VI has been observed in a sliding-spark discharge with a 5-m grazing-incidence spectrograph. The analysis has yielded nearly all levels of the $4p^4 4d$ configuration that can combine with the $4p^5\ ^2P$ ground term. All of the $4p^5 5s$ levels as given by Chaghtai were confirmed. The $4s^2 4p^4 4d + 4s^2 4p^4 5s + 4s 4p^6$ level structure has been theoretically interpreted, with configuration-interaction effects included. The $4s4p^6\ ^2S_{1/2}$ level was found to have a 24% $4s^2 4p^4(^1D) 4d^2 S$ character and the $4s^2 4p^4(^1D) 4d^2 S_{1/2}$ level a 21% $4s4p^6\ ^2S$ character. The energy parameters determined from a least-squares fit to the observed level values are compared with Hartree-Fock (HF) calculations. The ionization energy is estimated to be 95.8 ± 0.6 eV.

Ekberg, J. O., Hansen, J. E., Reader, J., **Analysis of the spectrum of seven-times-ionized molybdenum (Mo VIII) and isoelectronic comparison of the spectra Y V–Mo VIII,** *J. Opt. Soc. Amer.* **62,** No. 10, 1143-1148 (Oct. 1972).

Ekberg, J. O., Hansen, J. E., Reader, J., **Analysis of the spectrum of six-times-ionized niobium (Nb VII),** *J. Opt. Soc. Amer.* **62,** No. 10, 1139-1142 (Oct. 1972).

Key words: Niobium; spectra; ultraviolet; wavelengths.

The spectrum of Nb VII has been observed in a sliding-spark discharge with a 5-m grazing-incidence spectrograph. The analysis has yielded nearly all levels of the $4p^4 4d$ configuration that can combine with the $4p^5\ ^2P$ ground term. Seven of the eight levels of the $4p^4 5s$ configuration given previously by Charles and by Chaghtai were confirmed. A new value was found for the eighth. The $4s^2 4p^4 4d + 4s^2 4p^4 5s + 4s4p^6$ level structure has been theoretically interpreted, with configuration-interaction effects included. The $4s4p^6\ ^2S_{1/2}$ level was found to have a 22% $4s^2 4p^4(^1D) 4d^2 S$ character and the $4s^2 4p^4(^1D) 4d^2 S_{1/2}$ level a 20% $4s4p^6\ ^2S$ character. The energy parameters determined by a least-squares fit to the observed level values are compared with Hartree-Fock (HF) calculations. The ionization energy is estimated to be 118.9 ± 0.7 eV.

Elbourn, R. D., Saunders, P. B., **Simulation of air traffic control radar beacon code assignment plan 3dl,** *FAA Report No. FAA-RD-72-103,* 56 pages (National Technical Information Service, Springfield, Va., 22151, Sept. 1972).

Ely, J. F., Hanley, H. J. M., **Analysis of the viscosity and second virial coefficients of non-polar polyatomic gases using the m-6-8 potential,** *Mol. Phys.* **24,** No. 3, 683-687 (Sept. 1972).

Key words: Nonspherical interactions; polarizability; m-6-8 potential; quadrupole moment; second virial coefficients; viscosity coefficient.

The viscosity and second virial coefficients were calculated for O_2, N_2, and CO_2 using the m-6-8 potential. For the second virial coefficients, the potentials were modified to allow for nonspherical effects by introducing the quadrupole-quadrupole and quadrupole-induced dipole interactions. Independently measured values of the quadrupole moments and molecular polarizabilities were used without changing the spherical parameters as determined by the viscosity coefficients. Agreement between theory and experiment over a wide temperature range is shown to be satisfactory for the viscosity and improved for the second virial coefficients.

Enemark, E. A., Gallagher, A., **Electron excitation of the sodium *D* lines,** *Phys. Rev. A* **6,** No. 1, 192-205 (July 1972).

Evenson, K. M., Mizushima, M., **Laser magnetic resonance of the O_2 molecule using 119- and 78-μm H_2O laser lines,** *Phys. Rev. A* **6,** No. 5, 2197-2204 (Dec. 1972).

Key words: H_2O laser; laser magnetic resonance; laser spectroscopy; O_2; 119; 78 μm.

Laser magnetic resonance of the O_2 molecule is observed using the 119- and 78-μm lines of the H_2O laser. The relevant transitions for the 119-μm line are $(N=13, J=14, M) \rightarrow (N=15, J=14, M')$, and those for the 78-$\mu$m line are $(N=21, J=22, M) \rightarrow (N=23, J=22, M')$, where $M'=M$ or $M \pm 1$ depending on the polarization. It is found that $g_1 = 2.0044 \pm 0.0008$, $g_2 = 2.0020 \pm 0.0001$, $g_{n_2} = 0.000125 \pm 0.000008$ give slightly better agreement between theory and experiment than Hendrie and Kusch's values ($g_1 = 2.005169$, $g_2 = 2.001939$, $g_n = 0.000122$) and Bauer, Kamper, and Lustig's values ($g_1 = 2.004838$, $g_2 = 2.002025$, $g_n = 0.000126$), but the present experimental accuracy is not high enough to exclude these older g-factor values. Using the existing microwave data and the known laser frequencies, the zero-field frequencies for the transitions $(N=J=13) \rightarrow (N=J=15)$ and $(N=J=21) \rightarrow (N_{a-J}-23)$ are found to be 2496.283 ± 0.30 and 3865.81 ± 0.03 GHz, respectively. Combining these results with the frequency of the $(N=J=1) \rightarrow (N=J=3)$ transition obtained by McKnight and Gordy, we obtain $B_0 = 43.100518 \pm 0.000020$ GHz, $B_1 = -0.14496 \pm 0.00030$ MHz, and $B_2 = -0.17 \pm 1.00$ Hz.

Evenson, K. R., Wells, J. S., Petersen, F. R., Danielson, B. L., Day, G. W., **Accurate frequencies of molecular transitions used in laser stabilization: The 3.39-μm transition in CH_4 and the 9.33- and 10.18-μm transitions in CO_2,** *Appl. Phys. Lett.* **22,** No. 4, 192-195 (Feb. 15, 1973).

Key words: CO_2 and He-Ne laser frequency; methane; saturated absorption.

The frequencies of three lasers stabilized to molecular absorptions were measured with an infrared-frequency synthesis chain extending upwards from the cesium frequency standard. The measured values are 29.442 483 315(25) THz for the 10.18-μm $R(30)$ transition in CO_2, 32.134 266 891(24) THz for the 9.33-μm $R(10)$ transition in CO_2, and 88.376 181 627(50) THz for the 3.39-μm $P(7)$ transition in CH_4. The frequency of methane, when multiplied by the measured wavelength reported in the following letter, yields 299 792 456.2(1.1) m/sec for the speed of light.

Evenson, K. M., Wells, J. S., Petersen, F. R., Danielson, B. L., Day, G. W., Barger, R. L., Hall, J. L., **Speed of light from direct frequency and wavelength measurements of the methane-stabilized laser,** *Phys. Rev. Lett.* **29,** No. 19, 1346-1349 (Nov. 6, 1972).

Key words: Laser; light; methane-stabilized laser.

The frequency and wavelength of the methane-stabilized laser at 3.39 μm were directly measured against the respective primary standards. With infrared frequency synthesis techniques, we obtain $\nu = 88.376\ 181\ 627(50)$ THz. With frequency-controlled interferometry, we find $\lambda = 3.392\ 231\ 376(12)$ μm. Multiplication yields the speed of light $c = 299\ 792\ 456.2(1.1)$ m/sec, in agreement with and 100 times less uncertain than the previously accepted value. The main limitation is asymmetry in the krypton 6057-Å line defining the meter.

Fano, U., **Field configurations and parameters that identify states with $j=1$,** Chapter in *Spectroscopic and Group Theoretical Methods in Physics, Racah Memorial Volume,* F. Bloch, S. G. Cohen, A. De-Shalit, S. Sambursky, and I. Talmi, Eds., pp. 153-160 (North-Holland Publishing Co., Amsterdam, The Netherlands, 1968).

Key words: Angular momentum; atoms; molecules; nuclei; orientation.

This paper reviews the problem of identifying an arbitrary state within the set of degenerate energy eigenstates of a system isolated in space. For $j=1$, it presents a description and interpretation of identifying parameters and of their ranges of variation which is summarized in section 5.

Fatiadi, A. J., **The mechanism of formation of tris(phenylhydrazones) on treatment of cyclohexane-1,3-diones with phenylhydrazine,** *Carbohydrate Res.* **25,** 173-186 (Dec. 1972).

Key words: Cyclohexane-1,3-dione; formation; free-radical; ionic; mechanism; phenylhydrazine.

Treatment of the enolic cyclohexane-1,3-diones in aqueous acetic acid with an excess of phenylhydrazine at room temperature gave mixtures of the corresponding 2-oxo-1,3-bis(phenylhydrazone) and tris(phenylhydrazone) derivatives in low to moderate yield. E.s.r. study of the reaction path indicated that free-radical anionic intermediates are partially involved. Treatment of an enolic cyclohexane-1,2-dione (or of α-acetoxycyclohexanones) with phenylhydrazine gave mixtures of the corresponding mono- and bis(phenylhydrazones); formation of radical-anions was also observed in these reactions.

Finnegan, T. F., Wahlsten, S., **Observation of coherent microwave radiation emitted by coupled Josephson junctions,** *Appl. Phys. Lett.* **21,** No. 11, 541-544 (Dec. 1, 1972).

Key words: Junction array; radiation emmission; resonant tunnel junction.

We report here the results of a preliminary study of coherent microwave radiation emitted by a small array of interacting Josephson junctions, including the first direct observation of the superradiant state in pairs of junctions.

Florin, R. E., Wall, L. A., **Radicals detected by electron spin resonance during fluorination of polymers,** *J. Chem. Phys. Letters to Editor* **57,** No. 4, 1791-1792 (Aug. 15, 1972).

Key words: Electron spin resonance; fluorination; free radicals; polymer reactions.

Radicals of both peroxyl and fluorohydrocarbon structure are observed by electron spin resonance when organic polymers such as polystyrene and polyethylene are exposed to dilute fluorine. The character of the reactions suggests that F-atoms are the initiation species in this type of direct fluorination process.

French, B. M., Walter, L. S., Heinrich, K. F. J., Loman, P. D., Jr., Doan, A. S., Jr., Adler, I., **Compositions of major and minor minerals in five Apollo 12 crystalline rocks,** *NASA Spec. Publ.* **306,** 142 pages (National Aeronautics and Space Administration, Washington, D.C., 1972).

Key words: Apollo 12; electron probe analysis; lunar materials; mineral analysis; synthetic standards.

Analytical results are presented on polished thin selections of five Apollo 12 lunar samples. The techniques used are petrographic modal analysis and electron probe microanalysis, including energy-dispersive analysis. Natural minerals and synthetic glasses were used as standards for electron probe analysis.

Fuller, E. G., **Photonuclear physics, 1971,** *Proc. 5th Int. Betatron Symp., Bucharest, Romania, Oct. 18-23, 1971,* pp. 197-205 (Institute for Atomic Physics, Bucharest, Romania, Dec. 1972).

Key words: Experiment; neutrons; nuclear; photons; photonuclear; protons; reactions; theory.

A brief review is given of the present status of the photonuclear physics field. Recent new experimental data are described both in their historical context as well as in the light of recent theoretical work. Present trends in the field are indicated particularly with regard to new facilities and new techniques and their implication with regard to future experimental measurements and theoretical attempts to explain the data.

Furukawa, G. T., Douglas, T. B., Pearlman, N., **Heat capacities,** Chapter 4e in *American Institute of Physics Handbook, Third Edition,* pp. 4-105—4-118 (McGraw-Hill Book Co., Inc., 1972).

Key words: Debye characteristic temperature; Einstein function, Debye function; electronic specific heat; heat capacity; specific heat.

The work presents compilations of specific heats of the elements up to 3000 K, Debye characteristic temperatures and electronic coefficients of specific heat of the elements and some compounds, Einstein functions to five decimals at 0.1 intervals of the argument, and Debye functions to six decimals at 0.1 intervals of the argument. A short bibliography is given.

Gillen, K. T., Douglass, D. C., Malmberg, M. S., Maryott, A. A., **NMR relaxation study of liquid CCl_3F. Reorientational and angular momentum correlation times and rotational diffusion,** *J. Chem. Phys.* **57,** No. 12, 5170-5179 (Dec. 15, 1972).

Key words: Diffusion constant; dipole relaxation; molecular; spin lattice; temperature dependent.

Using pulsed NMR techniques, values of the self-diffusion constant D_s and the ^{19}F spin-lattice and rotating frame relaxation times, T_1^F and $T_{1\rho}^F$, have been obtained for CCl_3F over its entire liquid range. (~ 150 — 450 K). The dependence of $T_{1\rho}^F$ on the rotating field strength ω_1 has been used to derive temperature-dependent values of the ^{35}Cl spin-lattice relaxation time T_1^{Cl} and the chlorine to fluorine spin-spin coupling constant $J_{^{19}F-^{35}Cl}$ ($=11.9\pm0.4$ Hz, independent of temperature). Except at low temperatures where the intermolecular dipole-dipole relaxation mechanism is important, T_1^F is dominated by the spin-rotation interaction $(T_1^F)_{sr}$. Using D_s data to separate the dipole-dipole contribution from T_{1sr}^F allows us to estimate values of the angular momentum correlation time τ_J over a 300° temperature range. Over the same temperature range, values of T_1^{Cl} give the correlation times for molecular reorientation $\tau_{\theta,2}$. Although possible anisotropy in molecular motion and in the spin-rotation interaction precludes rigorous quantitative comparisons with rotational diffusion theory, the results for τ_J and $\tau_{\theta,2}$ are shown to be consistent with Gordon's extended J diffusion model. In particular, at high temperatures the molecular reorientation is no longer described by the small angular steps in classical theory: near the critical temperature τ_J and $\tau_{\theta,2}$ become of comparable magnitude and correspond to angular steps approaching 1 rad.

Goldman, D. T., **Properties of nuclides,** Section 8b in *American Institute of Physics Handbook, Third Edition,* D. E. Gray, Ed., pp. 8-6—8-91 (McGraw-Hill Book Co., New York, N.Y., 1972).

Key words: Absorption cross section; magnetic moment; mass defect; nuclides; quadrupole moment; q-values; radiation.

All known nuclides both stable and radioactive are listed together with the following properties where measured or appropriate: mass defect; half-life or abundance; magnetic moment; quadrupole moment; type of radioactive decays and energies associated with them; thermal neutron activation cross section. Data available through 1968 have been used in preparing the Table.

Greenspan, M., **Acoustic properties of liquids,** Section 3e in *American Institute of Physics Handbook, Third Edition,* D. E. Gray, Ed., pp. 3-86—3-98 (McGraw-Hill Book Co., New York, N.Y., 1972).

Key words: Absorption; acoustics; attenuation; liquids; sound; speed of sound; velocity of sound.

Values of the speed and attenuation of sound in selected liquids, taken from the literature, are presented in a way which illustrates the systematics. References to major compilations are given.

Greer, S. C., Sengers, J. M. H. L., Furukawa, G. T., **Heat capacity near the consolute point in solid CH_4 – Ar,** *J. Chem. Phys.* **57,** No. 12, 5052-5058 (Dec. 15, 1972).

Key words: Argon; calorimetry; critical phenomena; heat capacity; methane; mixture, binary; solution, solid.

Measurements are reported of the heat capacity at saturated vapor pressure (essentially C_p) of the system CH_4 – Ar near its solid-solid consolute point (62 K, 65% Ar). In contrast to the behavior of the heat capacity at binary liquid consolute points where there are striking anomalies, no large increase was observed for CH_4 – Ar. An abrupt increase of only about 13% occurred in the heat capacity near the transition. The possibility that the anomaly is suppressed by lattice strain effects is discussed.

Haber, S., **Experiments on optimal coefficients,** Chapter in *Applications of Number Theory to Numerical Analysis,* pp. 11-37 (Pergamon Press, Inc., New York, N.Y., 1972).

Haber, S., **On the existence of simple quadratures,** *Mich. Math. J.* **19,** 401-410 (1972).

Hahn, T. A., Kirby, R. K., **Thermal expansion of fused silica from 80 to 1000 K–Standard Reference Material 739,** (Proc. AIP Conf. on Thermal Expansion, Corning, N.Y., Oct. 27, 1971), Chapter in *Thermal Expansion,* M. G. Graham and H. E. Hagy, Eds., No. 3, 13-24 (1972).

Key words: Fused silica; standard reference material; thermal expansion.

Fused silica is the second of a series of materials to be certified as thermal expanion standards by the National Bureau of Standards. The results of tests of five samples indicate the stock to be consistent quality suitable for certification as Standard Reference Material 739. The same interferometer apparatus was used as in the certification of copper SRM 736. Expansivity values from each of the five samples were fitted using a least squares third order spline polynomial with three separate temperature intervals. The data from all the samples were then pooled and fit with the same type spline polynomial. Values calculated from these equations and their integrals are presented and also compared to literature data on fused silica.

Hamilton, C. A., Johnson, E. G., Jr., **Analog computer studies of subharmonic steps in superconducting weak links,** *Phys. Lett.* **41A,** No. 4, 393-394 (Oct. 9, 1972).

Hanley, H. J. M., Barker, J. A., Parson, J. M., Lee, Y. T., Klein, M., **Comments on the interatomic potential for argon,** *Mol. Phys.* **24,** No. 1, 11-15 (July 1972).

Hanley, H. J. M., McCarty, R. D., Cohen, E. G. D., **Analysis of the transport coefficients for simple dense fluids: Application of the modified Enskog theory,** *Physica* **60,** No. 2, 322-356 (Aug. 1972).

Key words: Excess transport property; modified Enskog theory; prediction of transport data; thermal conductivity; transport first density corrections.

The viscosity (η) and thermal-conductivity (λ) coefficients for argon, oxygen, and p-hydrogen have been calculated from the modified Enskog theory (*i.e.*, the hard-sphere Enskog theory adapted to include experimental *PVT* data) and compared with experiment over a wide range of experimental conditions. Specifically, experimental data and theoretical predictions for the first density corrections, η_1 and λ_1, were examined and the temperature and density dependences of the experimental and theoretical transport coefficients in the liquid were studied. A brief comparison of the modified Enskog with some other theories is included. Overall, the modified Enskog theory, with the exception of the critical region for the thermal conductivity, is found to given reasonable agreement with experiment (to within about 10-15 percent) for densities generally not exceeding twice the critical density.

Qualitatively the theory does not distinguish between the viscosity and thermal conductivity in the liquid. This is discussed by comparing the experimental and theoretical derivatives $(\partial\Delta\eta/\partial T)_\varrho$ and $(\partial\Delta\lambda/\partial T)_\varrho$, where $\Delta\eta$ and $\Delta\lambda$ are excess functions. The qualitative features of the theory are discussed in some detail leading to a method by which the predictive capability of the theory can be improved.

Harris, W. P., **A wide-range bridge for dielectric measurements,** *1971 Annual Report, Conf. on Electrical Insulation and Dielectric Phenomena, Williamsburg, Va., Nov. 1-3, 1971,* pp. 177-179 (National Academy of Sciences, Washington, D.C., 1972).

Key words: Amplifiers; capacitors; dielectric constant; dissipation factor; measurements.

By employing modern fast operational amplifiers (slewing rate of 1000 V/μsec) the useful frequency range of the bridge described several years ago as an ultra-low-frequency bridge, has been extended upward by approximately two decades. This gives it a frequency range of about nine decades, from 10^{-3} Hz to 1 MHz. A source capable of providing a second output shifted 90° from the primary output is required. Up to 10^5 Hz, this is provided by a single commercial instrument. Above 10^5 Hz, two sources are used, the second triggered by the first, with adjustable phase. The accuracy of the dielectric constant measurements is chiefly limited by the 0.1% uncertainty of the variable capacitors used. Phase shift in the inverters produces an error in the dissipation factor measurements, roughly proportional to frequency. The effect of this can be greatly reduced by using a substitution method, or a correction can be applied to direct measurements. A fast FET operational amplifier forms the heart of the detector, with high input impedance over the broad frequency range. Except at lowest frequencies, this bridge is characterized by rapid balancing, and extremely simple calculations.

Hastie, J. W., **Formation of H_2O_2 by adiabatic expansion of H_2-O_2 gas mixtures,** *Chem. Phys. Lett.* **17,** No. 2, 195-198 (Nov. 15, 1972).

Key words: Adiabatic expansion; hydrogen peroxide; mass spectrometry.

Mass-spectrometric studies of adiabatic expansions of H_2-O_2 and $H_2-O_2-N_2$ gas mixtures have revealed the formation of the species $H_2)O_2$ at concentrations of the order of $10^{-5}-10^{-4}$ mole fraction. This species is believed to be a relatively weakly bound isomer which is less stable than H_2O_2, the common form of hydrogen peroxide. A mechanism which is more consistent with the data is: $H_2+H_2+O_2\rightarrow H_2\cdot O_2+H_2$.

Hils, D., McCusker, M. V., Kleinpoppen, H., Smith, S. J., **Differential and direct differential elastic scattering cross sections for electrons and potassium atoms,** *Phys. Rev. Lett.* **29,** No. 7, 398-401 (Aug. 14, 1972).

Key words: Cross sections; elastic scattering; spin polarization.

In a modulated crossed-beam experiment we have elastically scattered unpolarized electrons of 3.3 eV energy from spin-polarized K atoms. A measurement of the polarization of the scattered electron yields $|f(\theta)|^2=\sigma(\theta)$. Our measured values of $|f|^2=\sigma(\theta)$ show a significant angular shift relative to the theoretical curve in forward-angle scattering ($\theta=20-40°$). This shift is not apparent in measurements of the differential scattering cross section $\sigma(\theta)$ over the same angular range, which, however, do show a significant angular shift in the range $\theta=50-120°$.

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Hilten, J. S., **Accelerometer calibration with the earth's field dynamic,** *Proc. 3d Annual Precision Measurement Association Metrology Conf., National Bureau of Standards, Gaithersburg, Md., June 17-18, 1970,* **1,** 27 (Precision Measurements Association, Burbank, Calif., 1970).

Key words: Accelerometer; air bearings; calibrator accelerometer; dynamic; earth's field; Inter-Agency Transducer Project; low frequency; rotational frequency response; transducer.

This paper describes a simple device for the precise dynamic calibration of certain accelerometers at low frequencies. Calibration of an accelerometer is achieved by rotating the instrument in the earth's gravitational field at a number of constant rotational speeds.

Hogben, D., **OMNITAB II: A computing system for statistical problem solving using Dutch rather than FORTRAN or ALGOL,** *Stat. Neerlandica* **26,** No. 3, 85-99 (1972).

Holt, H. K., **Theory of laser saturation spectroscopy,** *Phys. Rev. Lett.* **29,** No. 17, 1138-1140 (Oct. 23, 1972).

Key words: Laser; saturated absorption; spectroscopy.

A theory of the laser saturation spectroscopy experiments of Hänsch et al. is presented which is applicable at high values of the saturating laser beam. Phase- and velocity-changing collisions are taken into account.

Hord, J., **Cavitation in liquid cryogens II - Hydrofoil,** *NASA* **CR-2156,** 157 pages (National Aeronautics and Space Administration, Washington, D.C., Jan. 1973).

Key words: Cavitation; cryogenics; hydrofoil; nucleation; pumps; venturi.

This document constitutes the second of four volumes to be issued on the results of continuing cavitation studies. Boundary layer principles, and two-phase flow concepts, are used to improve existing correlative theory for developed cavity data. Details concerning cavity instrumentation, data analysis, correlative techniques, and experimental and theoretical aspects of a cavitating hydrofoil are given. Both desinent and thermodynamic data, using liquid hydrogen and liquid nitrogen, are reported here. The thermodynamic data indicated that stable thermodynamic equilibrium exists throughout the vaporous cryogen cavities. The improved correlative formulae were used to evaluate these data. A new correlating parameter, based on consideration of mass limiting two-phase flow flux across the cavity interface, is proposed. This correlating parameter appears attractive for future correlative and predictive applications. Agreement between theory and experiment is discussed, and directions for future analysis are suggested. The front half of the cavities, developed on the hydrofoil, may be considered as parabolically-shaped.

Horn, W. A., **Single-machine job sequencing with treelike precedence ordering and linear delay penalties,** *SIAM J. Appl. Math.* **23,** No. 2, 189-202 (Sept. 1972).

Horton, W. S., Ballard, D. B., **Scanning electron microscope studies of oxidized pyrolytic graphite,** *Carbon* **10,** 499-502 (1972).

Key words: Circular holes; face versus edge oxidation; impurity effect on oxidation; layers; pyrolytic graphite; scanning electron microscope.

Specimens of pyrolytic graphite (PG) that had been previously used for kinetic oxidation studies, as well as some unoxided specimens, were examined. The principal topographic features of oxidized PG faces included circular holes with flat bottoms and various depths. Some holes were basin-like at the top. The hole walls were striated showing layers parallel to the deposition surface. The bottom side (i.e., nearest the substrate) was more extensively oxidized than the top, and the hole diameters were an order of magnitude larger. In contrast to these essentially cylindrical pits were a few with the shape of a paraboloid of revolution. The edges had indications of circular holes also. However, a nibbled effect appeared more common. A major feature of a thick specimen was the non-uniformity of attack as a function of distance from the substrate surface. The large scatter of the earlier kinetic data is attributed to this varying reactivity.

Hougen, J. T., **On a vibration-rotation Hamiltonian for bimolecular collisions analogous to the Wilson-Howard vibration-rotation Hamiltonian for isolated molecules,** *J. Chem. Phys.* **56,** No. 12, 6245-6250 (June 15, 1972).

Key words: Angular momentum; bimolecular complex; collisions; group theory; molecule-fixed axes; selection rules; vibration-rotation Hamiltonian.

A bimolecular vibration-rotation Hamiltonian is derived which is analogous to the Wilson-Howard vibration-rotation Hamiltonian for isolated molecules. The bimolecular Hamiltonian involves the use of a "complex-fixed" axis system, i.e., a system with one of its axes along the line joining the centers of mass of the two interacting molecules. The bimolecular vibration-rotation Hamiltonian shows some similarities to the diatomic-molecule vibration-rotation-electronic Hamiltonian, the role of the two atoms in the diatomic molecule being played by the two interacting molecules, the role of the internuclear axis by the line joining the molecular centers of mass, and the role of electronic orbital and spin angular momenta by the vibration-rotation angular momenta of the two interacting molecules. The application of permutation-inversion molecular symmetry group ideas to a bimolecular complex is described.

Hudson, R. P., **Very low temperature data. Properties of paramagnetic salts,** Section 5f-15 in *American Institute of Physics Handbook, Third Edition,* pp. 5-224—5-242 (McGraw-Hill Book Co., Inc., 1972).

Key words: Low temperatures; paramagnetic salts.

Section 5f-15 of the American Institute of Physics Handbook has been revised and brought up to date.

Huebner, R. H., Mielczarek, S. R., Kuyatt, C. E., **Electron energy-loss spectroscopy of naphthalene vapor,** *Chem. Phys. Lett.* **16,** No. 3, 464-469 (Oct. 15, 1972).

Key words: Electron energy-loss spectroscopy; naphthalene vapor; Rydberg states; oscillator strength.

The naphthalene energy-loss spectrum from 3 to 16 eV obtained for 100 eV incident electrons closely resembles photoabsorption results. The need to include Rydberg configurations for any theoretical analysis of the spectrum is emphasized. The data yield an integrated oscillator strength of 8.6 below 15.1 eV.

Hummer, D. G., Rybicki, G. B., **The formation of spectral lines,** Chapter in *Annual Review of Astronomy and Astrophysics* **9,** 237-270 (Annual Reviews, Palo Alto, Calif., 1971).

Key words: Plasma diagnostics; radiating gases; radiative transfer; spectral lines; transfer equation.

An introductory survey is given of the current theory of spectral line formation in optically thick systems.

Jennings, D. A., Keller, R. A., **Detection of trace amounts of sodium by fluorescence emission excited by a continuous wave organic dye laser,** *J. Amer. Chem. Soc.* **94,** 9249 (1972).

Key words: Analytical; cw organic dye laser; fluorescence; laser; sodium vapor.

A cw organic dye laser was used to excite fluorescence in atomic sodium vapor. Fluorescence was visible at 80 °C, which corresponds to a vapor pressure of 1.5×10^{-6} mm of Hg. The concentration of sodium atoms at this pressure is 16 fg/cm³ or 4.2×10^{9} molecules/cm³. Measurements were actually made in a volume of approximately a mm³, which corresponds to 0.016 fg or 4.2×10^{5} molecules.

Jesch, R. L., Berry, I. S., **Batteries used with law enforcement communications equipment: Comparison and performance characteristics,** *LESP-RPT-0201.00,* 42 pages (U.S. Department of Justice, Law Enforcement Assistance Administration, National Institute of Law Enforcement and Criminal Justice, Washington, D.C., May 1972).

Jones, M. C., **Computed total radiation properties of compressed oxygen between 100 and 1000 K,** *Int. J. Heat Mass Transfer* **15,** No. 11, 2203-2215 (Nov. 1972).

Key words: Computations; oxygen; thermal radiation properties.

The total emissivity, total band absorptance and Planck mean absorption coefficient of compressed oxygen have been computed in the temperature range 100-1000 K. Computations were based on published data for the spectral absorption coefficient and extrapolations above and below room temperature were performed in accordance with published theory. It was found possible to represent all of the total band absorptance results with a two-parameter correlation.

Kamper, R. A., **Cryoelectronics,** *Proc. Helium Society Symp., Washington, D.C., Mar. 23-24, 1970,* pp. 68-82 (1970).

Key words: Electronics; low temperature; measurements; superconductivity.

This talk reviews achievements and prospects in the application of superconductivity to electronics and measurement technique. There is a brief introduction to some of the unique properties of superconducting metals at very low temperatures, and a survey of recent developments in the areas of magnetometry, thermometry, infrared technology, amplifiers, switches, low level detectors and voltmeters, and the measurement of fundamental constants. This is an exciting new field in which many researchers have already made impressive achievements.

Kelly, G. E., Sengers, J. V., **Collision integrals for the Knudsen number dependence of the growth rate of droplets in a supersaturated vapor,** *AEDC-TR-72-172,* 82 pages (Arnold Engineering Development Center, Air Systems Command, Arnold Air Force Station, Tenn., Dec. 1972).

Key words: Growth of droplets; kinetic theory of gases; liquid-vapor phase transitions; mass transport; nucleation theory; phase transitions.

A method is developed for calculating the mass flux to a liquid droplet surrounded by its pure vapor as a function of the Knudsen number. The Knudsen number K is defined as the ratio of the mean free path to the droplet size. When the mass flux is expanded in terms of the inverse Knudsen number $\alpha = K^{-1}$, we obtain a series of the form

$$\Gamma = \Gamma^{(0)} + \Gamma^{(1)}\alpha + \tilde{\Gamma}^{(2)}\alpha^2 \ln\alpha + \ldots$$

It is shown that the coefficients are determined by integrals associated with sequences of successive collisions among a number of vapor molecules and the droplet. In particular, we derive the collision integrals for the first three coefficients of the inverse Knudsen number expansion for Γ. These collision integrals bear a close similarity to the collision integrals derived in earlier technical reports for the density dependence of the transport properties of gases. It will be demonstrated in a subsequent technical report that the same method can be used to calculate the aerodynamic force on an object in a gas stream as a function of the Knudsen number.

Kirchoff, W. H., Johnson, D. R., **An investigation of centrifugal distortion in the microwave spectrum of formamide,** *J. Mol. Spectrosc.* **45,** No. 1, 159-165 (Jan. 1973).

Key words: Astrophysical interest; centrifugal distortion; formamide; microwave spectrum; quadrupole splittings; rotational transitions; weighted fit.

Measurements of the microwave spectrum of formamide have been extended in order to account accurately for the effects of centrifugal distortion. A total of 22 new transitions involving $J \leq 29$ have been measured for $^{14}NH_2{}^{13}CH^{16}O$ in the ground vibrational state. Combined with previous observations, these transitions have been fit to a model containing five quartic distortion terms and seven sextic terms with an rms deviation of 64 kHz. A large number of resolved quadrupole shifts were fit with an rms deviation of 42 kHz. The remainder of the spectrum for $J \leq 30$ has been calculated with standard deviations less than 3 MHz. Correct weighting of the observed transitions has been found to be important.

Koyama, R. Y., Hughey, L. R., **Angular anisotropies in the photoemission from polycrystalline gold,** *Phys. Rev. Lett.* **29,** No. 22, 1518-1521 (Nov. 27, 1972).

Key words: Emission angle; energy distributions; gold; incidence angle; photoemission; polarization; polycrystalline film; synchrotron radiation.

Measurements of the photoelectron energy distributions from gold indicate angular anisotropies of the emission even for evaporated films. In particular, relative intensities and positions of the *d*-band emission peaks depend on the electron emission angle. We also observe the dependence of the energy distribution on the incidence angle and polarization of the photons.

Krauss, J., Neumann, D., Wahl, A. C., Das, G., Zemke, W., **Excited electronic states of O_2^-,** *Phys. Rev. A* **7,** No. 1, 69-77 (Jan. 1973).

Key words: Adiabatic correlation; asymptotic states; configuration interaction; correlation energy; excited states; multi-configuration self-consistent field; O_2.

Excited electronic states of the O_2^- molecule have been calculated with configuration-interaction (CI) variational trial functions that assure formally correct asymptotic behavior as well as the single-configuration self-consistent-field (SCF) approximation. CI results were obtained by both multiconfiguration self-consistent-field (MC-SCF) and pseudonatural orbital (PNO) techniques. The MC-SCF results are most accurate and are used to analyze the energy curves and wave functions of these states for internuclear separations larger than 3 a.u. All the excited states are found to have equilibrium-internuclear separations at least 1 a.u. larger than the ground state. The two lowest energy states, the $^4\Sigma_u^-$ and $^2\Pi_u$, are characterized, respectively, as shape and valence Feshbach resonances. They are sufficiently bound to make it likely they play a role in low-energy-electron scattering by oxygen.

Kuehner, E. C., Alvarez, R., Paulsen, P. J., Murphy, T. J., **Production and analysis of special high-purity acids purified by sub-boiling distillation,** *Anal. Chem.* **44,** No. 12, 2050-2056 (Oct. 1972).

Key words: Distillation; isotope dilution; pure reagents; spark source mass spectrometry; sub-boiling; trace elements.

Sub-boiling distillation from pure quartz or Teflon (Du Pont) stills has been investigated for the production of high-purity inorganic acids and water. Nitric, hydrochloric, hydrofluoric, perchloric, and sulfuric acids produced by this method contained significantly lower cationic impurities than high-purity acids from commercial sources. A complete system, including the Class 100 environment, production, and storage of these high-purity reagents is described. A method based on spark source mass spectrographic isotope dilution analysis has been developed for the simultaneous determination of 17 elements in these materials. Results of the analyses of both the acids purified by sub-boiling distillation and the ACS reagent grade acids used as starting materials are reported. The sum of the common impurity elements determined in the purified acids ranged from 2.3 ppb in nitric acid to 27 ppb in sulfuric acid. No element in any of the purified acids exceeded 10 ppb and most were well below the 1-ppb level.

Kuriyama, M., **The dynamical scattering amplitude of an imperfect crystal. II. A relation between Takagi's dynamical equation and a more exact dynamical equation,** *Acta Crystallogr.* **A28,** Part 6, 588-593 (Nov. 1972).

Key words: Dynamical diffraction; imperfect crystal; scattering matrix.

A basic equation of dynamical diffraction for an imperfect crystal is derived based on a general dynamical theory of diffraction. This equation is given in the form of a differential equation, and therefore can be considered to describe the diffraction processes locally inside a crystal. A phenomenological interpretation of this equation helps to fill in the gap between modern quantum mechanical treatments and ordinary treatments by dynamical theory of diffraction for a perfect crystal. In the approximation of poor resolution the more exact equation reduces to Takagi's equation. A necessary condition which makes Takagi's equation valid leads to the concept of local reciprocal lattice vectors.

Kurylo, M. J., **Absolute rate constants for the reactions $H+O_2+M \rightarrow HO_2+M$ over the temperature range 203-404 K,** *J. Phys. Chem.* **76,** No. 24, 3518-3526 (1972).

Key words: Flash photolysis; H atoms; reaction kinetics; resonance fluorescence.

Absolute rate constants for the reaction $H+O_2+M \rightarrow HO_2+M$ have been measured by the flash photolysis-resonance fluorescence technique. For M = He, rate measurements over the temperature range 203-404 K and pressure range 10-400 torr gave the Arrhenius expression $k_1^{He} = [6.66 (+1.2, -1)] \times 10^{-33} \exp[(473 \pm 92)\text{cal mol}^{-1}/1.987T]$ cm^6 molecule^{-2} sec^{-1}. Comparisons of third-order rate constants at 298 K gave relative deactivation efficiencies of $CH_4/N_2/He/Ar = 15.7:3.4:1.0:1.0$. The efficiency ratio of N_2 to He was 4.5 at 226 K.

Laufer, A. H., Okabe, H., **Determination of the heat of formation of diazirine by photon impact,** *J. Phys. Chem.* **76,** No. 23, 3504-3507 (1972).

Key words: Absorption spectrum; diazirine; heat of formation.

Threshold energies of the incident photons required to initiate three primary processes in diazirine (I, II, and III) have been measured yielding 8.6, 7.6, and 11.8 eV, respectively. A lower limit for the heat of formation of diazirine may then be derived, namely, $\Delta H_f^\circ(c\text{-}CH_2N_2) \geq 60.6$ kcal/mol. A probable upper limit of $\Delta H_f^\circ(c\text{-}CH_2N_2) \geq 66$ kcal/mol is obtained from the observation that process I does not occur as a result of Xe (147 nm) photolysis. The difference between the photon impact and previous electron impact value is discussed. The absorption coefficient of diazirine in the region from 125 to 200 nm has been measured.

LaVilla, R. E., **The sulfur *K* and *L* and fluorine *K* x-ray emission and absorption spectra of gaseous SF_6,** *J. Chem. Phys.* **57,** No. 2, 899-909 (July 15, 1972).

Key words: Molecular orbital model; photon and electron excited emission spectra; resonance radiation; semi-Auger process; SF_6; x-ray absorption of sulphur *K*, *L* and fluorine *K*; x-ray emission of sulphur $K\alpha$, $K\beta$, *L* and fluorine $K\alpha$.

With the exception of the sulfur *L*-absorption spectrum, measurements of all the soft x-ray spectra from gaseous SF_6 in their respective threshold regions are reported. The valence emission x-ray spectra are interpreted in terms of a molecular orbital model of SF_6 with the inclusion of sulfur *d* orbitals. The experimental emission profiles are in fair agreement with a calculated profile based on the assigned orbital ionization energies and molecular orbital theory. The sharp resonance structures in the absorption spectra are found to result from the potential barrier formed by the surrounding fluorine atoms and are consistent with the molecular orbital model. The identification of the absorption resonance structure in terms of transitions to "virtual" unoccupied electronic levels is substantiated by the observation of "resonance radiation," i.e., x-ray emission in coincidence with the peak positions in the absorption region. The sulfur $K\alpha$ spectrum is also presented and discussed. A notable feature in this spectrum is a weak peak on the low energy side of the $K\alpha_{1,2}$ line, which is interpreted as a semi-Auger process.

Lehman, D. R., **Quasifree proton-proton and proton-deuteron scattering on ^{3}He,** *Phys. Rev. C* **6,** No. 6, 2023-2031 (Dec. 1972).

Key words: Pole dominance; quasifree scattering; rescattering effects; separable potentials; three-body problem; ^{3}He.

Quasifree proton scattering from ^{3}He is examined on the basis of available data. Cross sections are given in the pole-dominance approximation for either two protons or a proton and deuteron detected in coincidence. The cross sections are evaluated for a constant ^{3}He vertex and a separable-potential model of the ^{3}He vertex amplitude. Both two- and three-body breakup of ^{3}He are considered, with final-state rescattering included between the spectator nucleons in three-body breakup. It is shown that the asymptotic form of the coordinate-space ^{3}He wave function governs the shape of these low-momentum-transfer cross sections and that final-state rescattering between the spectator pair in ^{3}He$(p, 2p)pn$ mainly affects the magnitude of this cross section

Leiss, J. E., **Modern electron linacs and new user needs,** *Proc. 1972 Proton Linear Accelerator Conference, Los Alamos, N.M., Oct. 10-13, 1972,* Report No. LA-5115, UC-28, pp. 197-204 (Nov. 1972).

Key words: Accelerators; electron linacs; nuclear research; radiation applications.

Existing and future needs for linear accelerator developments and the possibility for linac technology to satisfy these needs are discussed. Two major needs for high duty cycle accelerators on the one hand and high peak pulse current accelerators on the other are identified.

Lias, S. G., Rebbert, R. E., Ausloos, P., **Gas phase pulse radiolysis of hydrocarbon mixtures; determination of the charge recombination rate coefficient and absolute rate constants of ion-molecule reactions of the *t*-butyl ion through a competitive kinetic method,** *J. Chem. Phys.* **57,** No. 5, 2080-2086 (Sept. 1, 1972).

Key words: Carbonium ions; hydrocarbons; ion-molecule reactions; neutralization; pulse radiolysis.

The gas phase pulse radiolysis of several neopentane-d_{12}-alkane mixtures has been studied with the purpose of examining the competition between the reaction of the fragment *t*-butyl ion with the alkane to form isobutane, $t\text{-}C_4D_9^+ + RH_2 \rightarrow i\text{-}C_4D_9H + RH^+$, and the neutralization of the *t*-butyl ion by an electron or SF_6^- ion, $t\text{-}C_4D_9^+ + X^- \rightarrow$ products. Using a computer calculation which takes into account the pulse characteristics as a function of time, the yield of isobutane observed in the reaction with 2,3-dimethylbutane (for which k_{r_2} was accurately determined to be $5.7 \pm 0.5 \times 10^{-11}$ cm^3/molecule·sec) and the dose per pulse, rate coefficients of the competing neutralization reactions were determined. These are $\alpha = 1.92 \pm 0.2 \times 10^{-6}$ cm^3/molecule·sec for neutralization by an electron, and $0.40 \pm 0.04 \times 10^{-6}$ cm^3/molecule·sec for neutralization by the SF_6^- ion. The latter value is independent of SF_6 concentration and both are independent of pressure between 40 and 200 torr. Finally, these values of the neutralization rate coefficients and yields of isobutane measured in the pulse radiolysis of neopentane in the presence of other added alkanes (2-methylpentane, 3-methylpentane, methylcyclopentane) are used to calculate absolute rate coefficients of the hydride transfer reactions between the $t\text{-}C_4D_9^+$ ion and these compounds; the values determined are in good agreement with those measured by other techniques. The unique feature of the competitive method described here consists of the fact that the positive ion which is neutralized can be identified by the conventional analysis of a known reaction product.

Lide, D. R., Jr., Johnson, D. R., Sharp, K. G., Coyle, T. D., **Microwave spectrum and barrier to internal rotation in CF_3SiF_3,** *J. Chem. Phys.* **57,** No. 9, 3699-3703 (Nov. 1, 1972).

Key words: Barrier to internal rotation in CF_3SiF_3; microwave spectrum; torsional mode.

The microwave spectrum of CF_3SiF_3 has been analyzed. The ground-state constants are $B_0 = 1328.464 \pm 0.001$ MHz, and $D_J = 0.09 \pm 0.05$ kHz. An extensive series of torsional satellite lines has been studied in some detail. The barrier to internal rotation is found to be 489 ± 50 cm^{-1}, corresponding to a torsional frequency of 37.0 ± 2.0 cm^{-1}. The lowest degenerate rocking mode has been determined as 158 ± 12 cm^{-1}. Other vibrational fundamentals are discussed.

Maienthal, E. J., Taylor, J. K., **Electrochemical techniques in water analysis,** Chapter 32 in *Water and Water Pollution Handbook,* L. L. Ciaccio, Ed., **4,** 1751-1800 (Marcel Dekker, Inc., New York, N.Y., June 1972).

Key words: Amperometry; chronopotentiometry; conductivity; coulometry; electrochemical analysis; polarography; potentiometry; water analyses; water pollution.

The uses of a variety of electrochemical methods of water analysis are described. The improved accuracy, sensitivity, selectivity, and ease of automation make these techniques the prime choice in many analytical problems concerned with water pollution and water analyses. The principles and applications of such methods as conductivity, potentiometry, amperometry, coulometry, chronopotentiometry, and polarography are discussed.

Manghnani, M. H., Fisher, E. S., Brower, W. S., Jr., **Temperature dependence of the elastic constants of single-crystal rutile between 4 and 583 K,** *J. Phys. Chem. Solids* **33,** 2149-2159 (1972).

Key words: Elastic constants: oxide; rutile; single crystal; temperature dependence.

Measurements of all the six principal elastic constants of single-crystal rutile were made in the temperature range of 298-583 K. The temperature derivatives (in kb/deg) at 298 K are: $dC_{11}/dT = -0.510$, $dC_{33}/dT = -0.900$, $dC_{44}/dT = -0.220$, $dC_{66}/dT = -0.458$, $dC_{12}/dT = -0.580$, and $dC_{13}/dT = -0.330$. Measurements of the four modes, C_{11}, $C' = (C_{11} - C_{12})/2$, C_{66}, and $C_{110L} = (C_{11} + C_{12} + 2C_{66})/2$, were extended to 4 K. Two features related to the temperature and volume dependences of the lattice vibrational frequencies are revealed: first, all the measured dC_{ij}/dT except dC'/dT become less negative with increasing temperature above 100 K. Second, dC'/dT is positive at all temperatures but decreases with increasing temperature at temperatures > 300 K. Indirectly shown is that $(\partial C'/\partial P)_T$ having a value of -1.32 at 298 K, decreases with decreasing temperatures. The significance of this latter fact is discussed in light of the computation of Grüneisen mode γ's from the acoustic $(\partial C_{ij}/\partial P)_T$ values, and the results are compared with $\gamma(\alpha_V)$ values obtained by Kirby from thermal expansion data. It is concluded that the large increase in $\gamma(\alpha_V)$ at low temperatures cannot be ascribed to a large temperature dependence of $(\partial C'/\partial P)_T$. Therefore, Kirby's explanation, that the large increase in $\gamma(\alpha_V)$ is caused by the large volume dependence of the acoustical mode frequencies, is not substantiated.

Marlowe, D. E., Steel, J. S., **A fatigue crack initiation detector,** *J. Mater.* **7,** No. 1, 28-31 (Mar. 1972).

Key words: Aircraft; bend tests; bolted joints; bolts; cracking (fracturing); crack initiation; cyclic loads; differentiating circuits; digital to analog converters; failure; fasteners; fatigue (materials); fatigue tests; linear systems; loads (forces); shear; transformers.

An instrument which detects the initiation of a fatigue crack in the head of a bolt, by measuring the change in relative position of the two ends of the double shear test joint at the maximum of the cyclic load as the crack propagates, has been developed. Increases in relative displacement of 0.00002 in. (0.0005 mm) can be reliably detected using the output of a linear variable differential transformer (LVDT). Detection of the initial head fillet crack should be a more reliable fatigue failure criterion and should result in less experimental scatter than catastrophic failure of the bolt. A detailed description of the instrument and examples of its use and performance are given.

Martin, W. C., Sugar, J., Tech, J. L., **Calculations of autoionizing d^9s^2np levels in Zn I, Cd I, and Hg I,** *J. Opt. Soc. Amer.* **62,** No. 12, 1488-1492 (Dec. 1972).

Key words: Cadmium; mercury; spectra; zinc.

Three Rydberg series of the type $d^{10}s^2\ {}^1S_0 - d^9s^2np$ $(J = 1)$ are known in each of these spectra. We have made intermediate-coupling calculations for the configurations Zn I $3d^94s^24p$, $5p$; Cd I $4d^95s^25p$, $6p$; and Hg I $5d^96s^27p$. The Slater parameters were determined to about 15% accuracy by various methods, or were adopted from previous calculations. Percentage compositions in the *LS* coupling scheme and in the scheme of highest purity are given for the three levels having $J = 1$ in each configuration. The results establish the most appropriate designations for these levels and for all of the higher d^9s^2np series members. Although the Zn I $3d^94s^24p$ $(J = 1)$ levels are found to be significantly perturbed, the calculated relative oscillator strengths of the three absorption transitions to these levels agree well with the experimental values. Some other comparisons with experiment are discussed, and the relative intensities of the three observed series within each spectrum are qualitatively explained.

Martin, W. C., Sugar, J., Tech, J. L., **Application of Slater-Condon theory with configuration interaction to the $5d^{10}6s6p$, $5d^96s^26p$, $5d^{10}6s7p$, and $5d^{10}6s5f$ configurations in Hg I, Tl II, Pb III, and Bi IV,** *Phys. Rev. A* **6,** No. 6, 2022-2035 (Dec. 1972).

Key words: Atomic energy levels; atomic theory; bismuth; configuration interaction; lead; mercury; thallium.

The calculations were based on fitting radial parameters to the observed energy levels, but with a requirement of regularity in the behavior of each parameter value along the isoelectronic sequence. Some parameters or ratios of parameters were fixed at values based on isoelectronic comparisons or adjusted Hartree-Fock values. The calculated levels, g values, and *LS* percentage compositions are given for each atom, and comparisons with experimental data are made. The results support new $5d^96s^26p$ levels recently found in Hg I, Tl II, and Bi IV, and one experimental $5d^96s^26p$ level in Pb III is rejected as unreal. The calculated ratio of the lifetimes of the Hg I $5d^{10}6s6p\ {}^3P_1^o$ and ${}^1P_1^o$ levels is compared with the experimental value. Some comparisons of calculated and observed isotope shifts are made for Hg I, Tl II, and Pb III. The leading percentages in the *jj* coupling scheme are listed for levels having assigned *jj* names ($5d^96s^26p$ levels in all four atoms and $5d^{10}6s7p$ levels in three atoms).

Marzzacco, C. J., Zalewski, E. F., **The fluorescence and phosphorescence spectra of pyrazine in benzene at 4.2 K,** *J. Mol. Spectry.* **43,** No. 2, 239-247 (Aug. 1972).

Key words: Fluorescence; phosphorescence; pyrazine; singlet emission; spectrum of pyrazine in benzene; triplet emission; vibration spectrum.

The fluorescence and phosphorescence spectra of pyrazine-h_4 and pyrazine-d_4 in benzene at 4.2 K are presented and analyzed. The Frank-Condon patterns of a_{1g} modes in the fluorescence spectrum are quite similar to those in the phosphorescence spectrum for both pyrazine-h_4 and pyrazine-d_4.

The ν_5 (b_{2g}) and ν_{10a} (b_{1g}) out-of-plane bending modes appear with quite different intensities in the fluorescence and phosphorescence spectra. The $0 \rightarrow 1$ transitions in these modes only appear in the fluorescence spectra while the $0 \rightarrow 2$ transitions are more intense in the phosphorescence spectra. These results are interpreted in terms of a vibronic interaction between ${}^1{}^3B_{2u}$ $(n\pi^*)$ and the ${}^1{}^3B_{2u}$ $(\pi\pi^*)$ and ${}^1{}^3B_{1u}$ $(\pi\pi^*)$ states.

No spectroscopic evidence is found for a forbidden $^1n\pi^*$ state below $^1B_{3u}$ $(n\pi^*)$.

Mauer, F. A., Hahn, T. A., **Thermal expansion of some azides by a single crystal x-ray method,** (Proc. AIP Conf. on Thermal Expansion, Corning, N.Y., Oct. 27, 1971), Chapter in *Thermal Expansion*, M. G. Graham and H. E. Hagy, Eds., No. 3, 139-150 (1972).

Key words: Azides; thermal expansion.

A modification of the Bond technique is used to measure the lattice constants of small crystals with an error of a few parts in 10^5 throughout the temperature range − 180 to 325 °C. Temperature calibration has been investigated and the results of thermal expansion measurements on KN_3 and $Ba(N_3)_2$ are reported.

McCarter, R. J., **The pyrolysis of cellulose at rates approaching those in burning,** *Text. Res. J.* **42,** No. 12, 709-719 (Dec. 1972).

Key words: Accessibility; Arrhenius plots; burned celluloses; celluloses; combustion; crystallinity; decomposition; DP; DTA; flame-retardant; $KHCO_3$; kinetics; moisture; oxygen indexes; pyrolysis; reaction rates; temperature; TGA; thermal analysis.

The thermal decomposition of cellulose was studied by a new thermal method suited to the measurement of faster reaction rates and to the problem of detecting concurrent reactions.

The pyrolysis data for four types of relatively pure cellulose indicated successive supramolecular and molecular decomposition steps, either of which may control the decomposition rate contingent upon the temperature history. The molecular decomposition step is interpreted as a first-order depolymerization reaction with an activation energy of 40 1/2 kcal/gmol.

The data for cellulose treated with retardant (1.5 wt% $KHCO_3$) indicated two principal decomposition reactions. An initial lower-temperature reaction evolved principally H_2O and CO_2 from well-dried samples. The following main decomposition reaction exhibited the same kinetic parameters as the counterpart depolymerization step of the untreated cellulose, but evolved different vapor products.

Tests and analyses of these celluloses at transitional stages of decomposition are summarized. The implications of the data concerning the mechanism by which the retardant functions are discussed.

McNeil, M. B., Pearson, W. B., Bennett, L. H., Watson, R. E., **Stabilization and chemical bonding in Zintl phases,** *J. Phys. C* **6,** 1-10 (1973).

Key words: Chemical bonding; phase stabilization; pseudopotential; Zintl phases.

The factors affecting the formation of B32 Zintl phases are examined. Evidence is presented that the pseudopotential effects discussed by others have not been shown to be essential, and that the structures must still be accounted for largely by geometric factors.

Meshkov, S., Rosen, S. P., **Lepton symmetry,** *Phys. Rev. Lett.* **29,** No. 26, 1764-1767 (Dec. 25, 1972).

Key words: Lepton; m-spin; neutrino; $SU(2)_M \times SU(2)_I$; trident production; weak interaction.

Assuming a weak interaction invariant under $SU(2)_M \times SU(2)_I$, we show that M-spin conservation leads to the rule $A(\nu_e e^-|\nu_e e^-) - A(\nu_\mu e^-|\nu_\mu e^-) = A(\nu_e \mu^-|\nu_\mu e^-)$ and to other sum rules for leptonic, semileptonic, and trident production processes. The additional assumption of total isospin conservation yields simple relations for lepton-hadron scattering. We also show that μ decay is forbidden in lowest order for various symmetry schemes such as the SU(3) and O(3) theories based upon the Konopinski-Mahmoud assignment of lepton number.

Miller, R. C., Kidnay, A. J., Hiza, M. J., **Liquid-vapor equilibria at 112.00 K for systems containing nitrogen, argon, and methane,** *AIChE J.* **19,** No. 1, 145-151 (Jan. 1973).

Key words: Argon; binary system; excess Gibbs energy; liquid-vapor; methane; nitrogen; phase equilibria; ternary system.

Liquid-vapor phase equilibria measurements were made at 112.00 K on the binary systems nitrogen-argon, nitrogen-methane, and argon-methane and the ternary system nitrogen-argon-methane. Values of g^E, the excess Gibbs free energy, have been calculated from the experimental data for all the systems studied. The data and derived g^E values for the binary systems were compared with the results of previous investigations with satisfactory agreement.

Miller, R. C., Kidnay, A. J., Hiza, M. J., **The solid + vapor and liquid + vapor phase equilibrium properties of neon + krypton,** *J. Chem. Thermodyn.* **4,** No. 6, 807-818 (Nov. 1972).

Key words: Krypton; melting line; neon; phase-equilibria.

A vapor-recirculation equilibrium cell was used to investigate the solid + vapor and liquid + vapor equilibria and the three-phase curve (equilibrium between solid, liquid, and vapor) for neon + krypton. Gas phase compositions were measured above solid krypton at 100.00, 110.00, and 115.00 K and at pressures to 95 atm (9.6 MPa). Both gas and liquid phase compositions were determined at 120.00, 130.00, 140.00, and 150.00 K at pressures to 106 atm (10.7 MPa). Comparison of cross second virial coefficients from the experimental gas phase results with values obtained from a corresponding states correlation indicate that a deviation parameter from the geometric mean mixing rule for energy parameters of approximately 0.23 is necessary to reconcile the experimental and predicted virial coefficients. Analysis of the Henry's law constants obtained from the liquid phase results indicates a deviation parameter of approximately 0.21.

Moore, L. J., Machlan, L. A., **High accuracy determination of calcium in blood serum by isotope dilution mass spectrometry,** *Anal. Chem.* **44,** No. 14, 2291-2296 (Dec. 1972).

Key words: Calcium; isotopes; mass spectrometry; serum.

An isotope dilution technique utilizing thermal ionization mass spectrometry has been developed for the accurate determination of calcium in synthetic and serum samples at the 100 μg/g level. Calcium was separated from a serum matrix by destruction of the organic matter with $HClO_4$ and HNO_3 followed by ion-exchange separation from interferences using AG 50W-X8 199-200 mesh resin. A mass spectrometric isotopic analysis procedure was developed using a $Ca(NO_3)_2$ solution deposited on Re sample filaments in a triple filament thermal ion source. The relative error between calculated and experimentally determined concentrations in synthetic calcium solutions was $\leqq \sim 0.1\%$. The 95% limit of error for a single analysis was $\sim 0.2\%$ for synthetic and serum samples. A comparison of the isotope dilution data with concurrently determined atomic absorption data from several clinical and independent laboratories is presented.

Mountain, R. D., **Evaluation of liquid structure data,** *J. Chem. Phys.* **57,** No. 10, 4346-4350 (May 17, 1972).

Key words: Liquid; liquid structure factor; neutron diffraction; pair correlation function; radial distribution function; x-ray diffraction.

A procedure for assessing the overall accuracy of liquid structure factor data is examined. The method makes use of the requirement that the two particle correlation function and its derivative vanish for separations smaller than the size of an atom. A series of numerical experiments, designed to evaluate this procedure, are discussed and a calibration of the method based on these experiments is presented. The method is sensitive when the over-all uncertainties in the data are smaller than 1%. Since this is just the level which is now being achieved in liquid structure measurements, the method should be quite useful in the evaluation of liquid structure data. As an illustration, the method is applied to recently published data for liquid neon and liquid gallium.

Negas, T., **The $Ba_{1-y}Sr_yMnO_{3-x}$ system,** *J. Solid State Chem.* **6,** 136-150 (1973).

Key words: Alkaline earth oxides; nonstoichiometry; oxidation-reduction; phase equilibria; transition-metal oxides.

Subsolidus phase relations at ambient atmospheric pressure and elevated temperatures in the $Ba_{1-y}Sr_yMnO_{3-x}$ system were investigated by quenching, gravimetric, and x-ray diffraction methods. The system is not binary above ~ 1035 °C because of reactions with atmospheric oxygen. The air isobar, P_{O_2}=0.2 atm, was characterized at 1225, 1375, 1490, and 1610 °C. Seven oxygen-deficient phases including a perovskite phase characterize the system. Their stability depends on the values of y and x in $Ba_{1-y}Sr_yMnO_{3-x}$. The cell dimensions of these phases expand as x increases at fixed y. These seven modifications can be retained in stoichiometric form by oxidation at lower temperatures.

O'Connell, J. S., Donnelly, T. W., Walecka, J. D., **Semileptonic weak interactions with C^{12},** *Phys. Rev. C* **6,** No. 3, 719-731 (Sept. 1972).

Key words: Beta decay; carbon; electromagnetic; form factor; muon; neutrino; weak interaction.

A unified analysis of semileptonic weak and electromagnetic interactions in nuclei is applied to the $A=12$ system. The particle-hole model is used to describe the nuclear dynamics of B^{12}, C^{12}, and N^{12}. Neutrino reaction cross sections are presented for comparison with future experiments.

Oettinger, F. F., Rubin, S., **The use of current gain as an indicator for the formation of hot spots due to current crowding in power transistors,** (Proc. 10th Annual IEEE Reliability Physics Symp., Las Vegas, Nev., Apr. 5-7, 1972), pp. 12-18 (1972).

Key words: Current gain, hot spot detection; hot spots, current gain as indication of; power transistors, screening; screening for hot spots, transistors; thermal hysteresis, transistors; transistors, hot spot detection.

D-C current gain, h_{FE}, measured as a function of collector voltage, with the collector current held constant, is used as a nondestructive screening technique to indicate the formation of hot spots due to current crowding. Its correlation with and advantages over previously used techniques are described. Examples of the use of this technique are presented for a variety of transistor operating conditions.

Ogburn, F., **Microscopical measurements of thickness: Manipulation of the microscope,** *Plating,* pp. 1155-1157 (Dec. 1972).

Ogburn, F., Smit, J., **Fluorescent x-ray methods for the measurement of coating thickness,** *Plating,* pp. 149-152 (Feb. 1973).

Key words: Coating thickness; electroplating; fluorescent x-rays; thickness; x-ray spectrometry.

The use of x-ray spectrometry to measure the thickness of electroplated coatings is outlined. Sources of errors are calibration standards, dead time of x-ray detector and associated electronics, deformation of specimen, nonuniformity of coating thickness, background radiation, polychromaticity of x-ray source, density variations, metallic impurities, and excitation of characteristic radiation of coating material by characteristic radiation from substrate material. Techniques of minimizing these errors are discussed.

Olin, J. S., Thompson, B. A., Sayre, E. V., **Characterization of medieval window glass by neutron activation analysis,** (Proc. Developments in Applied Spectroscopy, St. Louis, Mo., Oct. 18, 1971), Chapter in *Developments in Applied Spectroscopy,* A. J. Perkins, E. L. Grove, E. F. Kaelble, and J. E. Westermeyer, Eds., **10,** 33-55 (1972).

Key words: Activation analysis; archeology; glass; manganese; medieval windows; potassium; sodium.

Analytical data on medieval glasses are presented which indicate that alkali ratios and manganese-alkali ratios may be characteristic of the "ash" used in the glass manufacture. Thus, such data may be helpful in establishing the provenance of medieval glasses.

Olson, W. B., **The infrared spectrum of CH_3D. I. Ground state constants and perturbation allowed transitions,** *J. Mol. Spectrosc.* **43,** No. 2, 190-198 (Aug. 1972).

Key words: Infrared; molecular geometry; monodeuteromethane; perturbations; rotational constants; symmetric top.

The ground state rotational constants of CH_3D have been determined by a simultaneous least squares fit of combination differences obtained from twelve infrared absorption bands recorded in the region of 2380-3160 cm^{-1}. The direct determination of A_0 and D_0^K has been accomplished through combination differences obtained from transitions not ordinarily allowed in the infrared spectrum of a symmetric top molecule, but made possible through perturbations between excited rovibronic levels.

Olver, F. W. J., Sookne, D. J., **Note on backward recurrence algorithms,** *Math. Computation* **26,** No. 120, 941-947 (Oct. 1972).

Key words: Bessel functions; difference equations; error bounds; FORTRAN; Miller's algorithm; recursion.

An algorithm is given for the computation of the recessive solution of a second-order linear difference equation, based upon a combination of algorithms due to J. C. P. Miller and F. W. J. Olver. A special feature is automatic and rigorous control of truncation error.

The method is illustrated by application to the well-used example of the Bessel functions $J_r(x)$.

Parks, E. J., Hebert, R. L., **Thermal analysis of ion exchange reaction products of wood pulps with calcium and aluminum cations,** *Tappi* **55,** No. 10, 1510-1514 (Oct. 1972).

Key words: Aluminum; calcium; carboxylic acid; cellulose; differential thermal analysis; hemicellulose; ion exchange; pH; pyrolysis; thermal stability; thermogravimetric analysis; wood pulp.

Differential thermal analysis (DTA) and thermogravimetric analysis (TGA) indicate differences in the thermal stability of wood pulps of different compositions. Fourteen typical papermaking pulps having a reported alpha-cellulose content of 85-95% and a carboxyl content ranging from about 2.0 to 9.0 meq/100 g of pulp were purified by deashing with 0.1 *N* HCl, treated with calcium acetate to provide calcium exchange products and with alum to provide aluminum exchange products. The temperature of an endotherm (T_3) and that of the half volatilization temperature (T_l) were obtained from DTA and TGA data, respectively. The data indicate that T_3 and T_l are directly related to the pH of the various pulps and that pH in turn is a function of the number of carboxylic acid groups. T_3 and T_l are consistently lower for pulp-aluminum exchange products and higher for pulp-calcium exchange products than for the corresponding deashed pulps. These trends are interesting because of possible correlations with permanence. Both H^+ and Al^{+++} promote volatilization as shown by shifts in T_l to lower temperatures. Calcium retards volatilization, with the result that T_l values are shifted to higher temperatures. The same processes are probably also responsible in part for comparable shifts in T_3. There is evidence that hemicelluloses have an important bearing on thermal instability, but this is inconclusive. The concentrations of carboxylic acid groups, which may also be responsible for instability, are closely related to the hemicellulose content of the pulp.

Pedersen, N. F., Finnegan, T. F., Langenberg, D. N., **Magnetic field dependence and Q of the Josephson plasma resonance,** *Phys. Rev. B* **6,** No. 11, 4151-4159 (Dec. 1, 1972).

Key words: Josephson tunnel junction; magnetic field; microwave losses; quasiparticle interference current.

The results of an experimental study of the magnetic field dependence of the Josephson-plasma-resonance frequency and linewidth in Pb – Pb oxide – Pb tunnel junction are reported. In the presence of an external magnetic field, the plasma mode is found to be sensitive to an antisymmetric component of supercurrent density which is not observed in conventional measurements of the field-dependent critical current. The frequency and field dependence of the plasma-resonance linewidth are interpreted as evidence that the previously unobserved quasi-particle-pair-interference tunnel current predicted by Josephson exists and has the expected magnitude but the opposite sign.

Penner, S., Lightbody, J. W., Jr., Fivozinsky, S. P., Crannell, H., Hallowell, P. L., Finn, M., **Electron scattering studies of vibrator-spectrum nuclei,** (Proc. Int. Conf. on Nuclear Structure Studies Using Electron Scattering and Photoreaction, Sendai, Japan, Sept. 12-15, 1972), Paper in *Nuclear Structure Studies Using Electron Scattering and Photoreaction*, K. Shoda and H. Ui, Eds., **5**, 49-60 (Laboratory Report of Nuclear Science, Tohoku University, Tomizawa, Sendai, Japan, 1972).

Key words: Anharmonic vibrators; electron scattering; form factors; quadrupole moments, vibrator nuclei, ^{52}Cr, ^{110}Pd, ^{114}Cd, ^{116}Sn.

Inelastic electron scattering is being used to study vibrator-spectrum nuclei in the medium-A region. In many cases we find that the second 2^+ ("two phonon") state is much more strongly excited than is predicted by the harmonic vibrator model. The shapes and magnitudes of the form factors of these states can be fitted by calculations based on an anharmonic model in which mixing of one- and two-phonon wavefunctions is included. An experiment is underway to measure inelastic scattering form factors in ^{52}Cr, ^{110}Pd, ^{114}Cd, and ^{116}Sn. In all of these nuclei we find that the second 2^+ state is strongly enhanced compared to the harmonic vibrator model prediction.

Peterson, R. L., **Magnetophonon structure in the longitudinal magnetoresistance of nonpolar semiconductors,** *Phys. Rev. B* **6**, No. 10, 3756-3764 (Nov. 15, 1972).

Key words: Boltzmann equation; magnetoresistance; semiconductors; transport theory.

The magnetophonon effect in nonpolar nondegenerate semiconductors is investigated by solving the Boltzmann equation exactly in the Ohmic limit for combined optical- and acoustic-phonon scattering of carriers in parallel electric and magnetic fields. The solution is used in computing the longitudinal magnetoresistance at several temperatures and ratios of acoustic-to-optical-phonon scattering. As this ratio increases from zero at intermediate temperatures, the Gurevich-Firsov (GF) resonance maxima are found to broaden and shift toward higher magnetic field, with pronounced minima developing at the resonance fields before the magnetophonon structure vanishes at large acoustic-phonon scattering. As the temperature increases, additional (pseudoresonance) minima develop between the GF extrema, and are comparable in amplitude to the latter when kT approximates the optical-phonon energy. At these temperatures the GF extrema are minima, even in the absence of elastic scattering. The results are compared with displaced-Maxwellian computations. The various effects are explained by physical arguments, which suggest that the same effects should occur for polar materials also.

Pigman, W., Isbell, H. S., **Mutarotation of sugars in solutions: Part I,** Chapter in *Advances in Carbohydrate Chemistry* **23**, 11-57 (Academic Press, Inc., New York, N.Y., 1968).

Plumb, H. H., Powell, R. L., Hall, W. J., Swindells, J. F., **Temperature scales, thermocouples, and resistance thermometers,** Chapter 4a in *American Institute of Physics Handbook, Third Edition*, pp. 4-2–4-21 (McGraw-Hill Book Co., Inc., New York, N.Y., 1972).

Key words: Electrical resistivity; IPTS-68; temperature scale; thermal emf of elements; thermocouple tables; thermometry; thermometry fixed points.

An abbreviated version of the text of the International Practical Temperature is presented. The article includes the defining fixed points of the scale and the equations that are employed in utilizing standard platinum resistance thermometers, standard thermocouples and optical pyrometers in realizing the temperature scale. A table giving values of temperature differences between IPTS-68 and IPTS-48 is presented. Also included are tables of thermal emf of chemical elements, alloys and thermocouple materials relative to platinum. Thermocouple tables are listed for types S, R, E, J, K and T thermocouples at 10 °C intervals. Finally, the electrical resistivity of some elements and alloys as a function of temperature are given at 100 °C intervals.

Powell, C. J., Mandl, A., **High-resolution measurements of Auger-electron and photoelectron structure in the secondary-electron energy distributions of aluminum, nickel, and copper,** *Phys. Rev. B* **6**, No. 12, 4418-4429 (Dec. 15, 1972).

Key words: Aluminum; Auger transitions; copper; electronic density of states; nickel; secondary-electron energy distribution; x-ray photoemission.

Measurements are reported of selected structure in the secondary-electron energy distributions of evaporated aluminum, nickel, and copper. The specimens were bombarded with 3-keV electrons and the secondary structure was measured with a resolution of 0.1 eV. For each metal, it was hoped to measure Auger transitions involving two relatively narrow inner-shell levels and the valence band in order to obtain information on the valence-band density of states. Attempts were made to observe the Al $KL_{2,3}M$ Auger-electron energy distribution expected at about 1470 eV. Structure was, however, observed with a high-energy edge of 1485.9 ± 0.5 eV and a breadth of 8-9 eV. This structure was interpreted as being due to photoemission of valence electrons by internally generated $K\alpha$ x rays and was similar to uv photoelectron energy distributions and to the calculated density of states. Inelastic scattering of the photoelectrons obscures the expected Al $KL_{2,3}M$ structure. Auger-electron peaks in the ranges 730-800 and 820-865 eV were measured in the secondary-electron energy spectra for nickel and copper, respectively. Structure was observed in the $L_3M_{2,3}M_{4,5}$ Auger transition (over a range of about 20 eV) that could be associated in part with the final atomic states and in part with over-all features of the 3*d*-band density of states as determined by soft-x-ray-emission spectroscopy and x-ray photoelectron spectroscopy. It is believed that Auger-electron spectra can yield useful data on changes of electronic structure (e.g., by alloying or by compounding) but, in general, density-of-states data cannot be derived from the Auger spectra without detailed knowledge of the final states expected after the Auger transition of interest.

Prince, E., Finger, L. W., **Use of constraints on thermal motion in structure refinement of molecules with librating side groups,** *Acta Crystallogr.* **B29**, 179-183 (Mar. 1973).

Key words: Constrained refinement; least-squares refinement; molecular crystal structures; molecular libration; rigid-bodies; thermal constraints.

Explicit formulae are derived which express, for molecules consisting of a rigid core to which side groups that are free to librate around a single bond are attached, the second and third cumulants of the scattering density function as functions of molecular translation and libration parameters. These formulae and their derivatives with respect to the molecular motion parameters have been incorporated into a least-squares refinement program which determines directly the values of the position and thermal-motion parameters which give the best fit to the observed data.

Prince, E., Schroeder, L. W., Rush, J. J., **A constrained refinement of the structure of durene,** *Acta Crystallogr.* **B29**, 184-191 (Mar. 1973).

Key words: Barrier to rotation; conformation; crystal structure; durene; libration; methylbenzenes, methyl group; molecular structure; torsional oscillation.

The crystal structure of durene (1,2,4,5-tetramethylbenzene, $C_{10}H_{14}$) has been refined from three-dimensional, single-crystal neutron-diffraction data. The crystals are monoclinic, $a = 11.57$, $b = 5.77$, $c = 7.03$ Å, $\beta = 112.93°$ space group $P2_1/a$, $Z = 2$. A conventional refinement, with anisotropic temperature factors and 485 independent, observed reflections measured with a four-circle diffractometer, gave a weighted residual R, on F, of 0.085, but the model contained some physically unreasonable thermal parameters. An alternative refinement in which the molecule was constrained to move as a rigid body, but with the methyl groups permitted to librate around the C-C bond, gave a weighted R of 0.115. All differences in position parameters between the two models were small. All carbon atoms and 6 of the 14 hydrogen atoms in the molecule are essentially coplanar. The ring is somewhat distorted, with bond angles at the corners with no methyl groups of about 123° and those at the other corners of about 118.6°. The C-C bond length between two methylated corners is about 1.425 Å, compared with 1.395 Å for the other bonds in the ring. This long bond, combined with C-C-C bond angles of 121.5°, results in adjacent methyl groups being pushed apart. The methyl groups are in an eclipsed conformation. The eigenvectors of the L tensor correspond very closely to the axes of principal moments of inertia of the molecule. The hydrogen amplitudes derived from the refinement predict a methyl torsional frequency of 130 cm^{-1}, in satisfactory agreement with observed frequencies of 144 and 179 cm^{-1}. The whole molecule amplitudes and frequencies derived from the L and T components of the thermal ellipsoids are also generally consistent with spectroscopic results.

Rains, T. C., Menis, O., **Determination of submicrogram amounts of mercury in standard reference materials by flameless atomic absorption spectrometry,** *J. Ass. Offic. Anal. Chem.* **55,** No. 6, 1339-1344 (Nov. 1972).

Key words: Flameless atomic absorption; liver and coal; loss of mercury; mercury in orchard leaves; standard reference materials.

In a study of the flameless atomic absorption method for the determination of nanogram amounts of mercury in organic materials, the technique was improved to provide greater precision and accuracy. The loss of mercury during the digestion of organic materials with nitric, sulfuric, and perchloric acids is prevented by controlled heating and a packed refluxing column. The reduction and absorption system was simplified by using a heated absorption cell which alleviates the interference of volatile vapors. This method has been applied to the determination of mercury in NBS standard reference materials of orchard leaves, liver, and coal, and the results were compared with results obtained with two other analytical methods.

Raveché, H. J., Mountain, R. D., Streett, W. B., **Three atom correlations in the Lennard-Jones fluid,** *J. Chem. Phys.* **57,** No. 11, 4999-5006 (Dec. 1, 1972).

Key words: Closure approximation; high pressure; Lennard-Jones potential; liquid densities; Monte Carlo method; triplet correlation function.

The Monte Carlo method has been used to compute the triplet correlation function in a classical fluid with Lennard-Jones interactions. The computations were performed for particular configurations at five thermodynamic states of high density. The structure of the triplet function is discussed in the liquid and dense gas regions. Several closure approximations, which express the triplet function in terms of the pair correlation function, are compared to the Monte Carlo results.

Raveché, H. J., Mountain, R. D., **Three atom correlations in liquid neon,** *J. Chem. Phys.* **57,** No. 9, 3987-3992 (Nov. 1, 1972).

Key words: Closure approximation; isothermal/density derivative of pair correlation function; liquid neon; neutron scattering; pair correlation function; triplet correlation function.

We consider the correlation of three atoms in liquid neon from the neutron diffraction measurement of the isothermal density derivative of the pair correlation function. Several closure approximations for the triplet correlation function are discussed. Three of the approximations are representations of the triplet correlation function as a functional of the pair correlation function, and the other is expressed as a simple function of the pair correlation function.

Reader, J., Epstein, G. L., **Analysis of the spectrum of doubly ionized rubidium (Rb III),** *J. Opt. Soc. Amer.* **62,** No. 12, 1467-1476 (Dec. 1972).

Key words: Rubidium; spectra; ultraviolet; wavelengths; Zeeman effect.

The spectrum of Rb III has been observed in a sliding-spark discharge with the NBS 10.7-m normal-incidence vacuum spectrograph, and in an electrodeless discharge in a magnetic field with the NBS 10.7-m Eagle spectrograph in air. The analysis has yielded most of the levels of the $4p^44d$, $4p^45s$, and $4p^45p$ configurations. The $4p^45p$ levels and the $4s^24p^44d + 4s^24p^45s + 4s4p^6$ group of levels have been theoretically interpreted, with configuration interaction included. The energy parameters determined from a least-squares fit to the observed level values are compared with Hartree-Fock calculations. The ionization energy is estimated to be 39.0 ± 0.3 eV.

Rebbert, R. E., Ausloos, P., **Photolysis of methane: Quantum yield of $C(^1D)$ and CH,** *J. Photochem.* **1,** 171-176 (1972/73).

Key words: C-atoms; collisional deactivation; free radical reactions; methane; photolysis; quantum yields.

It is demonstrated that $C(^1D)$ and $CH(^2\pi)$ species are formed in the photodissociation of CH_4 at $\lambda = 123.6$ nm [$\Phi(C) = 0.4 \pm 0.1 \times 10^{-3}$, $\Phi(CH) = 5.9 \pm 0.5 \times 10^{-2}$] and at $\lambda = 104.8$-106.7 nm [$\Phi(C) = 6.5 \pm 0.5 \times 10^{-3}$, $\Phi(CH) = 0.23 \pm 0.03$]. There is no evidence for C or CH production at wavelengths where the photoionization quantum yield is equal to unity.

Redding, R. W., **Rotational levels of double-minimum potentials: The linear BAB molecule with unequal bond lengths,** *J. Mol. Spectrosc.* **38,** No. 2, 396-414 (May 1971).

Key words: Double-minimum potentials; large-amplitude vibrations; linear molecules; rotational constants; triatomic molecules; vibration-rotation Hamiltonian.

The rotational constants and energy levels for the linear BAB system are studied under the assumption of unequal A–B bond lengths. The quantum mechanical Hamiltonian is derived according to a formalism which allows for a large-amplitude antisymmetric stretching motion. A numerical integration technique is used to obtain solutions of the one-dimensional Schroedinger equation corresponding to a zeroth-order approximation of the Hamiltonian. The behavior of the resulting rotational constants for various heights of the barrier in the double-minimum potential is discussed.

Reimer, G. M., Wagner, G. A., Carpenter, B. S., **The thermal stability of fission tracks in the Standard Reference Material glass standard (National Bureau of Standards),** *Radiat. Eff. Communication* **15,** 273-274 (1972).

Key words: Fission track; glass; nuclear track technique; Standard Reference Material; thermal stability; uranium.

The relatively low thermal stability of fission tracks in the National Bureau of Standards Standard Reference Material glass indicates that those glasses that are to be used as fission track references should be stored at temperatures below 20 °C. The low track stability may be due to the relatively high sodium and calcium content of the glasses.

Roder, H. M., Weber, L. A., Editors, **ASRDI Oxygen Technology Survey: Volume I. Thermophysical properties,** *NASA Spec. Publ.* **3071,** 434 pages (National Aeronautics and Space Administration, Washington, D.C., 1972).

Key words: Computer programs; gaseous oxygen; graphs; handbook thermophysical properties; liquid oxygen; oxygen; property value uncertainties; solid oxygen; tables.

This Handbook is the result of an extensive survey of the thermophysical properties of oxygen, including densities and the thermodynamic, transport, electrical, optical, and molecular properties for the gaseous and fluid states. A thorough bibliography of published work on each property is given. Recommended references are cited for those properties which have been critically surveyed. Other references are listed which were reviewed but not considered as basic source material. Each property is described and defined; selected values are presented for the more common properties; and, where appropriate, graphical presentation is also made. The major tables cover the range 100-600 °R for pressure to 5000 psia (55-340 K, 340 atmospheres or 345×10^5 Pa). In addition, for property values beyond this range, recommended references are given, where available. The Handbook is designed to provide a convenient reference for the user.

Rowe, J. M., Rush, J. J., de Graaf, L. A., Ferguson, G. A., **Neutron quasielastic scattering study of hydrogen diffusion in a single crystal of palladium,** *Phys. Rev. Lett.* **29,** No. 18, 1250-1253 (Oct. 30, 1972).

Key words: Hydrogen diffusion; hydrogen in metals; jump diffusion; neutron scattering; palladium hydride; quasielastic scattering; single crystal.

The diffusion of hydrogen in a single crystal of palladium ($PdH_{0.03}$) has been studied by quasielastic neutron scattering. The results provide the best evidence yet obtained for the applicability of a simple jump model of hydrogen diffusion in a metal and confirm the predominant occupation of octahedral sites in the Pd crystal, with a mean residence time at 623 K of 2.8 psec between jumps.

Rowe, J. M., Sköld, K., Flotow, H. E., Rush, J. J., **Quasielastic neutron scattering by hydrogen in the α and β phases of vanadium hydride,** *J. Phys. Chem. Solids* **32,** 41-54 (Apr. 1971).

Key words: Activation energy; hydrogen diffusion; lattice sites; neutron scattering; phase transition; quasielastic scattering; vanadium hydride.

The diffusion of hydrogen in the α and β phases of vanadium hydride has been studied by neutron inelastic scattering. Samples of $VH_{0.198}$, $VH_{0.602}$ and $VH_{0.570}$ were used to determine the temperature and concentration dependence of the diffusion in the α-phase. An activation energy of 550 ± 50 K was derived from the temperature dependence of hydrogen diffusion in the $VH_{0.198}$ sample. The theoretical neutron scattering cross-section for jump diffusion among the octahedral and tetrahedral interstitial sites of body-centered cubic lattices has been derived and compared to the experimental results. No conclusions about the site occupation in the α-phase can be drawn from these results. The data for the β-phase of $VH_{0.570}$ indicate an abrupt decrease in the diffusion rate at the $\alpha \rightarrow \beta$ transition.

Rukwied, A., Ballard, D. B., **Scanning electron microscope fractography of continuously cast high purity copper after high temperature creep,** *Metallurgical Trans.* **3,** 2999-3008 (Nov. 1972).

Key words: Creep cavitation; fractography; high purity copper; impurity segregation structure; stereo scanning electron microscopy.

Fracture surfaces produced by high temperature creep were studied using the scanning electron microscope. The material investigated was continuously cast high purity copper containing a nodal impurity segregation structure at which grain boundary voids are formed during creep. The observed void shape suggests that vacancies are supplied mainly via grain boundaries, and also by enhanced diffusion via segregation nodes; the vacancies seem to originate mainly at internal sources. The known distribution of potential nucleation sites was used to study the efficiency of the segregation structure in nucleating voids under various test conditions. Within the range of conditions employed, three different fracture modes were observed in separate regions of the stress-temperature plane. The regions are sequentially denoted *A*, *B*, and *C* as the temperature is increased at a given stress; they shift to lower temperatures as the stress is increased. In region *A* fracture is initiated by extensive cavitation along grain edges (line of junction of three grains); cavitation at the segregation structure seems to be of secondary importance. In region *B* formation and growth to coalescence of voids at segregation nodes governs fracture; the change of growth mechanisms with test conditions is discussed. In region *C* fracture is controlled by plastic instability.

Rukwied, A., **High temperature creep cavitation mechanisms in a continuously cast high purity copper,** *Metallurgical Trans.* **3,** 3009-3023 (Nov. 1972).

Key words: Angular distribution of cavities; cavitation; copper; creep; grain boundaries; grain boundary sliding; nucleation of cavities; segregation nodes; vacancy condensation.

Continuously cast high purity copper was used to study intergranular high temperature creep fracture mechanisms. With the help of an internal marker system due to impurity segregation, grain boundary sliding, GBS, was found to have occurred to a similar extent on cavitated and uncavitated boundaries. To explain this phenomenon a void nucleation model involving small nonwetting shearable particles is suggested. Metallographic observations and the apparent activation energy derived from fracture time data indicate the operation of the vacancy condensation mechanism at the lower temperatures and higher stresses. At the higher temperatures and lower stresses void growth is enhanced by GBS. This cavitation mechanism obtains strong support from measurements of the distribution of voids on grain boundaries as a function of the boundary angle with respect to the tensile direction. Computer analysis of these distributions, in terms of a model which properly accounts for the distribution of potential nuclei, yields bimodal curves exhibiting peaks at grain boundaries oriented for high shear stress (peak I), and for high normal stress (peak II). A phenomenological equation is proposed for the dependence of peak I on test conditions. Peak II is thought to be caused by nucleation by local GBS and growth by vacancy condensation under locally enhanced normal stress.

Rush, J. J., Schroeder, L. W., Melveger, A. J., **Dynamics of sodium and potassium bifluoride: Infrared, Raman and neutron studies,** *J. Chem. Phys.* **56,** No. 6, 2793-2800 (Mar. 15, 1972).

Key words: Bending vibration; bifluoride ion, hydrogen bonding; infrared; lattice modes; neutron scattering; Raman; stretching vibration.

The crystal and molecular dynamic of $NaHF_2$ and KHF_2 have been studied by infrared and Raman spectroscopy and by neutron inelastic scattering. Infrared absorption spectra have been measured in the region of the bending (ν_3) and asymmetric stretching (ν_3) vibrations of $NaHF_2$ and KHF_2 containing 2%, 11%, and ≈ 80% DF_2^-. The spectra show a rather striking reduction in the widths of the DF_2^- absorption peaks as well as shifts in peak frequencies as the percent DF_2^- is lowered toward a "defect" concentration. These results indicate that the considerable width of the infrared absorption bands assigned to the ν_2 and ν_3 modes in pure $NaHF_2$ and KHF_2 is associated with coupling of near-neighbor HF_2^- oscillators having similar frequencies or energy states. The Raman spectrum for $NaHF_2$ shows peaks at 630.5 and 145 cm^{-1} which can be unambiguously assigned, respectively, to the HF_2^- symmetric stretching mode (A_{1g}) and the E_g librational lattice mode. The KHF_2 Raman spectrum is similar to a previous result, with some differences in the frequencies of the lat-

tice-mode peaks. The combined neutron and far-infrared spectra on $NaHF_2$ provide information on the acoustic and optical translational lattice modes. An approximate vibrational frequency distribution is derived from the neutron spectrum and compared with previous spectroscopic and theoretical results on NaN_3. A detailed assignment of the internal and lattice modes for both sodium and potassium bifluoride is presented.

Ruthberg, S., **The measurement of conductance to free molecular flow by substitution procedures,** *J. Vac. Sci. Technol.* **9,** No. 6, 1457-1469 (Nov.-Dec. 1972).

Key words: Clausing factors; free molecular flow; precision ionization gauges; stable vacuum systems; transmission probability; vacuum calibration; vacuum measurements.

A method is presented which yields an order of magnitude increase in precision in the measurement of conductance to free molecular flow. The technique utilizes a calibrated variable conductance as a reference in a true substitution procedure. A series line was used to study balanced and unbalanced conditions and to explore the effects of various factors on precision, such as flow stability, pump behavior, ionization gauge sensitivity and response, temperature, transients, and sorption. A parallel line was used for measurements on short tubes of small diameter. For this, an iteration technique was employed for the calibration of the variable conductance on an absolute basis. Ionization gauge resolution of 0.02% and linearity of better than 0.1% were achieved. Relaxation effects were apparent. Conductance measurement precision of a few parts per 1000 was obtained. Transmission probabilities for the small diameter, short tubes showed deviations of as much as 18% from the Clausing factors at length-to-radius ratios ≥ 1, but approached the Clausing values as $l/r \rightarrow 0$. Deviations of $< 1\%$ from the Clausing value required $l/r \leq 0.05$.

Sadowski, W. L., Lozier, D. W., **Use of Olver's algorithm to evaluate certain definite integrals of plasma physics involving Chebyshev polynomials,** *J. Comput. Phys.* **10,** No. 3, 607-613 (Dec. 1972).

Key words: Asymptotic solutions; Chebyshev polynomials; difference equations; evaluation of integrals; numerical stability; Olver's algorithm; plasma physics; recurrence relations.

The paper presents three methods of evaluating a sequence of definite integrals involving Chebyshev polynomials of the first kind. The integrals arise in a nonlinear plasma physics problem. It is shown that the first algorithm suffers such a loss of precision that the computed sequence diverges. The second algorithm yields results that lose all significance for higher terms in the sequence, although the sequence does not diverge.

The problem is then formulated in terms of a three-term inhomogeneous recursion. Asymptotic analysis shows that neither forward nor backward recursion is stable. Olver's algorithm provides a method with an a-priori error bound for calculating the sequence of integrals.

Tables of values obtained by the three methods are compared.

Saylor, C. P., **Supercooling in the barnyard,** *Chemistry* **45,** No. 11, 19-20 (Dec. 1972).

Schmidt, A. F., Editor, **ASRDI Oxygen Technology Survey: Volume III. Heat transfer and fluid dynamics—abstracts of selected Technical Reports and Publications,** *NASA Spec. Publ.* **3076,** 172 pages (National Aeronautics and Space Administration, Washington, D.C., 1972).

Seitz, M. G., Walker, R. M., Carpenter, B. S., **Improved methods for measurement of thermal neutron dose by the fission track technique,** *J. Appl. Phys.* **44,** No. 1, 510-512 (Jan. 1973).

Key words: Fission tracks; glass; mica; microscopy; neutron dose measurements; uranium.

We describe scanning electron microscope and reflected light observations of fission tracks that lead to highly reproducible track density measurements for different observers. These new observational techniques are used to calibrate two uranium-doped glasses for neutron dose measurements. The glasses are available to other investigators.

Sengers, J. M. H. L., Klein, M., Gallagher, J. S., **Pressure-volume-temperature relationships of gases; virial coefficients,** Chapter 4i in *American Institute of Physics Handbook, Third Edition,* pp. 4-204—4-221 (McGraw-Hill Book Co., Inc., New York, N.Y., 1972).

Key words: Air constituents; Boyle temperature; deuterium; hydrogen; intermolecular potential; inversion temperature; methane; noble gases; potential parameters; second virial coefficient; third virial coefficient; water vapor.

Tables of second virial coefficients as functions of temperature are presented for 14 gases. These gases are mainly noble gases and constituents of all. In most cases, these are based on a reexamination of the original P-V-T data. Where necessary and possible, these data have been refitted and improved experimental virials determined. In the case of eight of these gases, it has been possible to fit the experimental second virials to those predicted by the $(m, 6)$ potential function and potential parameters determined. In almost all cases, an optimum fit was obtained for m-18. The optimum potential function was used for extrapolating the tables somewhat beyond the experimental range, and for obtaining temperature derivatives of B. In the case of the other six substances virial coefficients predicted by the $(m, 6)$ functions were used as a smoothing aid. Experimental third virial coefficients are presented at the experimental temperatures. A table of Boyle and Joule-Thomson inversion temperatures is also presented.

Sengers, J. V., **Transport properties of fluids near critical points,** (Proc. Int. School of Physics "Enrico Fermi," Varenna on Lake Como, Italy, July 27-Aug. 8, 1971), Chapter in *Critical Phenomena,* pp. 445-507 (Academic Press, Inc., New York, N.Y., 1971).

Key words: Binary liquids; critical phenomena; dense gases, phase transitions; thermal conductivity; transport properties; viscosity.

The paper reviews the situation concerning transport properties of fluids in the vicinity of critical points. Methods for measuring viscosity and thermal conductivity are examined and a critical assessment is presented of the experimental results. The paper covers the viscosity and thermal conductivity in binary liquid mixtures near the mixing point, in gases near the gas-liquid critical point and in liquid He I near the superfluid transition. The experimental results are interpreted in terms of current theoretical predictions.

Shafer, M. R., Jr., Baker, D. W., **Practical considerations for gas flow measurement,** *Proc. 3d Annual Precision Measurement Association Metrology Conf., National Bureau of Standards, Gaithersburg, Md., June 17-18, 1970,* **1,** 187-227 (Precision Measurements Association, Burbank, Calif., 1970).

Key words: Flowmeter calibration; gas density; gas flow measurement; gas viscosity; mass and volume flow; volumetric proving.

Physical variables and relations encountered in the metering of gases and the calibration of gas flowmeters are reviewed. As modified by the compressibility factor to account for the behavior of real gases, the equation of state is given and the relation between mass and volume rate in steady flow is discussed. Application of these relations to volumetric proving or calibration of meters is explained.

Shine, R., Linsky, J. L., **Physical properties of solar chromospheric plages. 1. Line profiles of the CaII H, K and infrared triplet lines,** *Solar Phys.* **25,** 357-379 (Aug. 1972).

Key words: Observations of solar spectra lines; solar atmosphere; solar chromosphere; solar plages.

Double pass photoelectric observations are presented of five Ca II lines (H, K, 8498 Å, 8542 Å, and 8662 Å) in a number of solar plages of different degrees of activity, quiet regions, and a sunspot. The data are compared with previous work. All five lines show increasing emission together in plages and the least opaque of the infrared triplet lines appears to exhibit core emission prior to the more opaque members of the multiplet. The question of source function equality is considered and the differences and similarities among plage profiles and between plage and quiet profiles are shown qualitatively and quantitatively.

Sieck, L. W., Ausloos, P., **Reactions of the acetone cation. Implications for the radiolysis of acetone,** *Radiat. Res.* **52,** No. 1, 47-58 (Oct. 1972).

Key words: Acetone; energy transfer; ion-molecule reactions; mass spectrometry; radiolysis.

The reactions of the acetone and acetyl cation with acetone have been investigated in a photoionization mass spectrometer. Reaction of the acetone cation with $\lesssim 0.3$ eV internal energy occurs essentially at every collision ($k = 8.4 \times 10^{-10}$ ml/molecule sec), but decreases slightly with an increase in internal energy. Two reaction channels are observed for the acetone cation: (a) $CH_3COCH_3^+ + CH_3COCH_3 \rightarrow (CH_3)_2COH^+ + CH_3COCH_2$ and (b) $CH_3COCH_3^+ + CH_3COCH_3 \rightarrow CH_3COCH_3COCH_3^+ + CH_3$. The CH_3CO^+ ion reacts mainly as follows: $CH_3CO^+ + CH_3COCH_3 \rightarrow CH_3COCH_3COCH_3^+$ ($k \cong 4.6 \times 10^{-10}$ ml/molecule sec). At pressures above 10^{-3} torr $(CH_3)_2COH^+$ and $CH_3COCH_3COCH_3^+$ reacts further with acetone to produce $(CH_3COCH_3)_2H^+$. It is suggested that in liquid phase radiolysis experiments the acetone cation will react within $10^{-12} - 10^{-13}$ sec. Recent radiolysis experiments in which acetone was used as a solvent are discussed in the light of this premise.

Sieck, L. W., Gorden, R., Jr., Ausloos, P., **Energy-dependent ring opening of cycloalkane parent ions,** *J. Amer. Chem. Soc.* **94,** No. 20, 7157-7159 (Oct. 4, 1972).

Key words: Cycloalkanes; ion-molecule reactions; isomerization; mass spectrometry; photoionization; proton transfer reactions.

In contradiction to a previously held view it is demonstrated that cyclopropane parent ions do undergo ring opening. The extent of ring opening depends on the internal energy content of the ion. It is shown that the cyclic ion reacts with NH_3 in the following manner

$$c\text{-}C_3D_6^+ + NH_3 \rightarrow CD_2H_2N^+ + C_2D_4H \quad (1)$$

$$\rightarrow CD_3H_3N^+ + C_2D_4 \quad (2)$$

while the linear $C_3D_6^+$ ion reacts exclusively by deuteron transfer

$$C_3D_6^+ + NH_3 \rightarrow C_3D_5 + NH_3D^+ \quad (3)$$

The total rate constant for reaction of the $C_3D_6^+$ ions formed by photoionization of cyclopropane-d_6 is independent of the internal energy content ($k_{total} = 9.4 \pm 0.4 \times 10^{-10}$ cm³/molecule-sec). However, the relative rates of reactions 1, 2, and 3 are strongly dependent upon the photon energy [$k_3/(k_1 + k_2) = 0.18$ and 0.75 at 10 and 11.6 – 11.8 eV respectively]. Additional experiments performed on $C_3D_6 - CH_3OH$ mixtures support the view that the fraction of the $C_3D_6^+$ ions which transfer a deuteron to NH_3 is representative of the fraction of acyclic $C_3D_6^+$ in the system.

Simmons, J. H., Macedo, P. B., Volterra, V., **Analysis of composition fluctuation lifetimes in a critical oxide mixture by volume relaxation spectroscopy,** *J. Non-Cryst. Solids* **11,** No. 4, 357-367 (Jan. 1973).

Key words: Composition fluctuations; critical point phenomena; immiscibility; oxide glasses; ultrasonic spectroscopy; volume relaxation.

The distribution of volume relaxation times in a critical oxide mixture is calculated from longitudinal and shear modulus measurements. Ultrasonic relaxation allows the investigation of two distinct effects in the distribution of relaxation times as the temperature is lowered toward the critical point. At high temperatures, a coupling between the compressional component of the ultrasonic wave and supercritical fluctuations in composition leads to an anomalous broadening of the distribution of volume relaxation times. This interaction allows a measure of the average composition fluctuation lifetime, τ_D, as a function of temperature. At lower temperatures, as τ_D becomes longer than the volume relaxation times, the behavior of the distribution follows closely the predictions of an environmental relaxation model proposed by these authors for the analysis of shear relaxation processes in the same material.

Smith, R. L., Russell, T. W., Case, W. E., Rasmussen, A. L., **A calorimeter for high-power CW lasers,** *IEEE Trans. Instr. Meas.* **IM-21,** No. 4, 434-438 (Nov. 1972).

Key words: Calorimetry; laser; laser calorimetry; laser energy measurement; laser power measurement.

A calorimeter is described that can measure megajoules of laser energy from CW lasers whose output wavelength is in the region from 1 to 11 μm. The calibration of this device is traceable to NBS electrical standards. This calorimeter can measure total energies from 3×10^4 to 10^7 J. The laser power range this device can handle ranges from 300 to 100 000 W.

Snyder, W. F., **Basic electronic standards,** Chapter 3 in *Basic Electronic Instrument Handbook,* C. F. Coombs, Jr., Ed., pp. 3-3–3-64 (McGraw-Hill Book Co., New York, N.Y., 1972).

Key words: Basic electronic standards; classification of electronic standards; DC standards; low frequency standards; standards (coaxial connectors); standards (waveguide or coaxial line); traceability of electrical standards.

A classification of "atlas" of electronic standards is presented by selection of frequency range, electrical quantity, and an echelon of standards. The reader is referred, by a classification key, to many hundreds of literature sources for detailed information on standards, calibration methods, and measurement techniques.

Snyder, W. F., **Standards,** Chapter 2 in *Basic Electronic Instrument Handbook,* C. F. Coombs, Jr., Ed., pp. 2-1–2-16 (McGraw-Hill Book Co., New York, N.Y., 1972).

Key words: Echelon of standards; electrical quantities; environments for standards laboratories; International System derived units; National Bureau of Standards; standards.

Brief accounts are given of the electrical system of units, the International System (SI) of derived units, an echelon of standards, the role of the National Bureau of Standards, and environments for standards laboratories.

Souders, T. M., **Wide-band two-stage current transformers of high accuracy,** *IEEE Trans. Instrum. Meas.* **IM-21,** No. 4, 340-345 (Nov. 1972).

Key words: Current measurement, audio frequency; current ratio measurement; current transformers, audio frequency; current transformers, precision; transformers, amplifier-aided; transformers audio frequency current; transformers, calibration of; transformers, capacitive error trimming; transformers, precision current; transformers, two-stage current.

The design and performance of two high-accuracy transformers, identified as amplifier-aided two-stage transformers, are described. Each operates from 50 Hz to 10 kHz, supporting burdens up to 1 Ω. Self-contained ratios span from 5/5 to 100/5, with a rated secondary current of 5 A.

Results indicate the errors at 10 kHz are within 30 and 15 ppm for the respective transformers, decreasing to less than 1 ppm at 1 kHz.

Analysis of high- and low-frequency errors is presented, as well as a detailed description of a capacitance trimming technique effecting a factor-of-ten reduction of capacitive errors.

Also described is a relatively simple step-up calibration system for determining the transformer errors. Calibration results are included.

Spencer, L. V., Simmons, G. L., **Improved moment method calculations of gamma-ray transport: Application to point isotropic sources in water,** *Nucl. Sci. Eng.* **50, 20-31 (1973).**

Key words: Gamma ray penetration; moments method; point gamma source in water; polynomial approximation; radiation transport; truncation error.

Estimated error bounds derived from polynomial calculations have been used to revise the truncation error estimates of published data on gamma-ray penetration in water. It is also shown that more efficient use of moment data is possible to obtain greater accuracy in specific penetration regions and to extend the accuracy of polynomial calculations to greater penetrations. The results also indicate that in addition to the asymptotic power law, data to perhaps 40 mean-free-paths may be needed to make accurate extrapolations to arbitrarily great penetrations.

Steiner, B., **Photodetachment of S^-: Behavior of the cross section above threshold,** Paper in *Sixth International Conference on the Physics of Electronic and Atomic Collisions, Massachusetts Institute of Technology, Cambridge, Massachusetts, July 28-Aug. 2, 1969, Abstracts of Papers, Session C-8,* pp. 535-537 (Massachusetts Institute of Technology Press, Cambridge, Mass., 1969).

Turner, J. E., Dutrannois, J., Wright, H. A., Hamm, R. N., Baarli, J., Sullivan, A. H., Berger, M. J., Seltzer, S. M., **The computation of pion depth-dose curves in water and comparison with experiment,** *Radiat. Res.* **52,** 229-246 (1972).

Key words: Depth dose; dosimetry; ionization chambers; pions; radiobiology; transport calculations.

A Monte Carlo program has been written for calculating absorbed dose as a function of position in a water target irradiated by beams of pions (π^+ and π^-). The incident pions can have an arbitrary energy spectrum, at present limited to 125 MeV, this energy including most beams that have been used in radiobiological experiments. The presence of muons and electrons, which contaminate pion beams in practice, is also included. The incident particles may enter the target at any point and with any direction of travel. Calculations can thus be made for nonparallel, nonuniform beams. The size of cylindrical volumes in the target over which the absorbed energy is averaged can be varied to simulate the use of detectors of various dimensions. The calculations include pion-nucleus interactions, multiple coulomb scattering, pion and muon decay at rest, as well as the transport and further interactions of secondary protons and neutrons. Good agreement is obtained between calculated and measured depth-dose curves with π^+ and π^- beams from the 600 MeV Synchro-cyclotron at CERN. The program will be used to study various factors that affect the dose and LET patterns that can be obtained with realistic pion beams.

Voth, R. O., **Safety of hydrogen pressure gauges,** Chapter on Safety Considerations in *Advances in Cryogenic Engineering. A Collection of Invited Papers Presented at National Technical Meetings During 1970 and 1971,* **17,** Paper F-2, 182-187 (Plenum Press, Inc., New York, N.Y., 1972).

Key words: Gauge case design; hydrogen embrittlement; hydrogen gas; pressure gauges; safety.

To determine the relative safety of various gauge case designs, thirty-five pressure gauges were purchased and intentionally ruptured using high pressure hydrogen gas. Fire was emitted from nearly all gauges; however, gauges with solid fronts and plastic crystals emitted the fire and debris out the rear of the case making them safer for use in a hydrogen system. One brand of gauge ruptured at reduced pressure when tested with hydrogen. The reduced rupture pressure indicated possible hydrogen embrittlement of the pressure sensing element.

Wachtman, J. B., Jr., Dundurs, J., **Large localized surface stresses caused by thermal expansion anisotropy,** *J. Amer. Ceram. Soc. Discussion and Notes* **54,** No. 10, 525-526 (Oct. 1971).

Key words: Grain size; Griffith equation; Petch equation; thermal expansion anisotropy; strength; surface stress.

The stress in the surface of a polycrystalline solid arising from thermal expansion anisotropy is calculated from a model of an elastic sphere in a homogeneous material. The results depend strongly on the distance of the sphere from the surface and suggest that the usual calculation, which ignores the effect of the surface, seriously underestimates this stress.

Weisman, H. M., **Reaching other people's minds through written language,** *Tech. Commun.* **20,** No. 1, 16-19 (1973).

Weisman, I. D., Bennett, L. H., Maxwell, L. R., Sr., Woods, M. W., Burk, D., **Recognition of cancer in vivo by nuclear magnetic resonance,** *Science* **178,** 1288-1290 (Dec. 22, 1972).

Key words: In vivo; mouse; nuclear magnetic resonance; relaxation time; tumor.

Pulsed nuclear magnetic resonance has been used to differentiate in vivo between normal mouse tail tissue and a malignant transplanted melanoma, S91, located on the tail. The tumor displayed a nuclear (proton) spin-lattice relaxation time of ~ 0.7 second contrasted with the simultaneously measured normal tail tissue relaxation time of ~ 0.3 second.

Wiederhorn, S. M., **A chemical interpretation of static fatigue,** *J. Amer. Ceram. Soc.* **55,** No. 2, 81-85 (Feb. 1972).

Key words: Crack propagation; fracture; glass; mechanical properties; strength.

The effect of water on the growth of cracks in glass is discussed. Crack motion is believed to result from a stress-enhanced chemical reaction between water and glass and is influenced strongly by the crack-tip OH^- ion concentration. This hypothesis is supported by the observation that crack-velocity data can be correlated with measurements of pH in slurries of ground glass and water. Variation of the measured pH from 5 to 12, depending on glass composition, suggests a wide pH variation at crack tips. The types of chemical reactions that establish the slurry pH are discussed, and it is noted that the slurries behave as weak acids, buffered solutions, or salts of weak acids, depending on glass composition.

Williams, E. R., Olsen, P. T., **A noncontacting magnetic pickup probe for measuring the pitch of a precision solenoid,** (Proc. Conf. Precision Electromagnetic Measurements, National Bureau of Standards, Boulder, Colo., July 1972), *IEEE Trans. Instr. Meas.* **IM-21,** No. 4, 376-379 (Nov. 1972).

Key words: Fine structure constant; fundamental constant; gyromagnetic ratio of proton; NBS ampere; pitch measurement.

The magnetic-field gradients produced by a current sequentially activating a few turns of wire of a precision solenoid are used to measure its pitch. The position of the activated portion of wire can be resolved to 0.1 μm. Preliminary results are found to be in agreement with an earlier measurement using a contacting probe to within the uncertainty of the latter determination. This new technique reduces many of the difficulties associated with conventional pitch measuring schemes and at the same time provided a method of obtaining increased accuracy.

Williams, E. S., **Calibration of thermal voltage converters,** *Proc. 3d Annual Precision Measurement Association Metrology Conf., National Bureau of Standards, Gaithersburg, Md., June 17-18, 1970,* **1,** 131-139 (Precision Measurements Association, Burbank, Calif., 1970).

Key words: Ac-dc transfer; comparator; thermal voltage converter; transfer standard.

Ac-dc difference corrections for thermal voltage converters are obtained by comparing one instrument with another whose corrections are already known. Present methods of making such comparisons are reviewed, and a new TE (thermoelement) comparator is described. This comparator is relatively simple and inexpensive, reduces the effect of power supply instability, and gives accuracies better than 10 parts per million.

Youden, W. J., **Enduring values,** *Technometrics* **14,** No. 1, 1-11 (Feb. 1972).

Key words: Interlaboratory comparisons; philosophy of design; physical constants; variance components.

Why do results obtained by different investigators characteristically disagree by more than would be expected by their estimates of uncertainty? Youden notes that everything gets changed in another laboratory, whereas the investigator can (or does) make only minor changes within his laboratory. The message of this paper—that only those bounds for uncertainty based on actual measurement will endure—is already beginning to have an impact on physical measurement. Designed experiments to estimate bounds to systematic error will replace fallible judgment based on feelings and not observation.

Youden, W. J., **Randomization and experimentation,** *Technometrics* **14,** No. 1, 13-22 (Feb. 1972).

Key words: Experimental design; philosophy of design; randomization; restricted randomization.

Randomization, often specified as an indispensable requirement in experimental design, is required only when the order or position of the experimental unit influences the performance of the unit. Randomization, when required, may give an arrangement that is obviously undesirable and one that may doom the particular experimental program. A system of constrained randomization is proposed that eliminates the undesirable arrangements without sacrificing the customary gains achieved by randomization.

Zalubas, R., Borchardt, B. R., **Energy levels of neutral praseodymium (Pr I),** *J. Opt. Soc. Amer. Letters to Editor* **63,** No. 1, 102-103 (Jan. 1973).

Key words: Atomic energy levels; first spectrum of praseodymium (Pr I); spectrum.

The spectrum of atomic praseodymium has been observed with variety of light sources and spectrographs. The Zeeman effect has also been recorded. Three levels of $4f^3 6s^2\ {}^4I^\circ$ ground term and 62 even high levels of Pr I have been found.

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Contents

Page

The Thermodynamic Kelvin Temperature Scale from 273.15 K to 415 K. Leslie A. Guildner and Robert E. Edsinger. 383

An alumina standard reference material for resonance frequency and dynamic elastic moduli measurement. II. Characteristic values for use from 25 °C to 1000 °C. Robert W. Dickson and Edward Schreiber. 391

Heat capacities of polyethylene from 2 to 360 K. I. Standard samples of linear and branched polyethylene whole polymer. S. S. Chang and A. B. Bestul. 395

The quasi-harmonic approximation and a generalized Grüneisen equation of state. Frederick I. Mopsik. 407

Valence resonance states of N_2^-. M. Krauss and D. Neumann. 411

Internal electric fields near isolated defects in ionic crystals. Herbert S. Bennett. 413

Wavelengths and energy levels of the second spectrum of cerium (Ce II). Charles H. Corliss. 419

Publications of the National Bureau of Standards. 547

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